

**Forest Carbon Partnership Facility (FCPF)
Carbon Fund**

Emission Reductions Program Document (ER-PD)

ER Program Name and Country:

Ghana Cocoa Forest REDD+ Programme (GCFRP)

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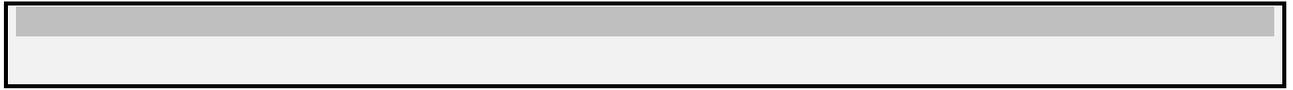


Table of Contents

EXECUTIVE SUMMARY	6
LIST OF ACRONYMS.....	9
1. ENTITIES RESPONSIBLE FOR MANAGEMENT & IMPLEMENTATION OF ER PROGRAM 13	
1.1 ER PROGRAMME ENTITY THAT IS EXPECTED TO SIGN THE EMISSION REDUCTION PAYMENT AGREEMENT (ERPA) WITH THE FCPF CARBON FUND.....	13
1.2 ORGANIZATION(S) RESPONSIBLE FOR MANAGING THE PROPOSED ER PROGRAMME	13
1.3 PARTNER AGENCIES AND ORGANIZATIONS INVOLVED IN THE ER PROGRAMME	14
2. STRATEGIC CONTEXT & RATIONALE FOR THE ER PROGRAMME	18
2.1 CURRENT STATUS OF THE READINESS PACKAGE AND SUMMARY OF ADDITIONAL ACHIEVEMENTS OF READINESS ACTIVITIES IN THE COUNTRY	18
2.2 AMBITION AND STRATEGIC RATIONALE FOR THE ER PROGRAMME	22
2.3 POLITICAL COMMITMENT	27
3. ER PROGRAM LOCATION	30
3.1 ACCOUNTING AREA OF THE ER PROGRAM	30
3.2 ENVIRONMENTAL AND SOCIAL CONDITIONS IN THE ACCOUNTING AREA OF THE ER PROGRAM.....	31
4. DESCRIPTOIN OF ACTIONS AND INTERVENTIONS TO BE IMPLEMENTED UNDER THE PROPOSED PROGRAM	34
4.1 ANALYSIS OF DRIVERS AND UNDERLYING CAUSES OF DEFORESTATION AND FOREST DEGRADATION, AND EXISTING ACTIVITIES THAT CAN LEAD TO CONSERVATION OR ENHANCEMENT OF FOREST CARBON STOCKS	35
4.2 ASSESSMENT OF MAJOR BARRIERS TO REDD+.....	38
4.3 DESCRIPTION AND JUSTIFICATION OF THE PLANNED ACTIONS AND INTERVENTIONS UNDER THE ER PROGRAM THAT LEAD TO EMISSION REDUCTIONS AND/OR REMOVALS	42
A. <i>Institutional Coordination & MRV</i>	45
B. <i>Landscape Planning within HIA areas</i>	49
C. <i>Increasing Yields via CSC</i>	51
D. <i>Risk Management/Finance</i>	54
E. <i>Legislative and Policy Reforms</i>	57
4.4 ANALYSIS OF LAWS, STATUTES AND OTHER REGULATORY FRAMEWORKS	58
4.5 EXPECTED LIFETIME OF THE PROPOSED ER PROGRAM	61
4.6 EXPECTED LIFETIME OF THE PROPOSED ER PROGRAMME.....	64
5. STAKEHOLDER CONSULTATION AND PARTICIPATION	65
5.1 DESCRIPTION OF STAKEHOLDER CONSULTATION PROCESS	65
5.2 SUMMARY OF THE COMMENTS RECEIVED AND HOW THESE VIEWS HAVE BEEN TAKEN INTO ACCOUNT IN THE DESIGN AND IMPLEMENTATION OF THE ER PROGRAM.....	68
6. OPERATIONAL AND FINANCIAL PLANNING	77
6.1 INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS	77
6.2 ER PROGRAM BUDGET	80
7. CARBON POOLS, SOURCES AND SINKS	83
7.1 DESCRIPTION OF SOURCES AND SINKS SELECTED.....	83
7.2 DESCRIPTION OF CARBON POOLS AND GREENHOUSE GASES SELECTED	83
8. REFERENCE LEVEL	86
8.1 REFERENCE PERIOD.....	86
8.2 FOREST DEFINITION USED IN THE CONSTRUCTION OF THE REFERENCE LEVEL.....	86
8.3 AVERAGE ANNUAL HISTORICAL EMISSIONS OVER THE REFERENCE PERIOD	87

8.3.1	<i>Description of method used for calculating the average annual historical emissions over the Reference Period</i>	87
8.3.2	<i>Deforestation activity data and emission factors used for calculating the average annual historical emissions over the Reference Period</i>	88
8.3.3	<i>Degradation from legal timber harvest activity data and emission factors used for calculating the average annual historical emissions over the Reference Period</i>	98
8.3.4	<i>Degradation from illegal timber harvest activity data and emission factors used for calculating the average annual historical emissions over the Reference Period</i>	101
8.3.5	<i>Degradation from forest fire activity data and emission factors used for calculating the average annual historical emissions over the Reference Period</i>	103
8.3.6	<i>Degradation from Woodfuel activity data and emission factors used for calculating the average annual historical emissions over the Reference Period</i>	109
8.3.7	<i>Enhancement of carbon stocks activity data and emission factors used for calculating the average annual historical emissions over the Reference Period</i>	111
8.3.9	<i>Calculation of the average annual historical emissions over the Reference Period</i>	115
8.4	ESTIMATED REFERENCE LEVEL.....	116
8.5	RELATION BETWEEN THE REFERENCE LEVEL, THE DEVELOPMENT OF THE FREL/FRL FOR THE UNFCCC AND THE COUNTRY’S EXISTING OR EMERGING GREENHOUSE GAS INVENTORY.....	121
9.	APPROACH FOR MEASUREMENT, MONITORING AND REPORTING	121
9.1	MEASUREMENT, MONITORING AND REPORTING APPROACH FOR ESTIMATING EMISSIONS OCCURRING UNDER THE ER PROGRAM WITHIN THE ACCOUNTING AREA.....	121
9.2	ORGANIZATIONAL STRUCTURE FOR MEASUREMENT, MONITORING AND REPORTING	130
9.3	RELATION AND CONSISTENCY WITH THE NATIONAL FOREST MONITORING SYSTEM.....	139
10.	DISPLACEMENT	139
10.1	IDENTIFICATION OF THE RISK OF DISPLACEMENT	139
10.2	ER PROGRAM DESIGN FEATURES TO PREVENT AND MINIMIZE POTENTIAL DISPLACEMENT	140
11.	REVERSALS	142
11.1	IDENTIFICATION OF RISKS OF REVERSALS	142
11.2	ER PROGRAM DESIGN FEATURES TO PREVENT AND MITIGATE REVERSALS	144
11.3	REVERSAL MANAGEMENT MECHANISM	144
11.4	MONITORING AND REPORTING OF MAJOR EMISSIONS THAT COULD LEAD TO REVERSALS OF ERS	145
12.	UNCERTAINTIES OF THE CALCULATION OF EMISSION REDUCTIONS.....	145
12.1	IDENTIFICATION AND ASSESSMENT OF SOURCES OF UNCERTAINTY.....	145
12.2	QUANTIFICATION OF UNCERTAINTY IN REFERENCE LEVEL SETTING	150
12.3	HOW UNCERTAINTIES WILL BE REDUCED.....	151
13.	CALCULATION OF EMISSION REDUCTIONS	151
13.1	EX-ANTE ESTIMATION OF THE EMISSION REDUCTIONS.....	151
14.	SAFEGUARDS	152
14.1	DESCRIPTION OF HOW THE ER PROGRAM MEETS THE WORLD BANK SOCIAL AND ENVIRONMENTAL SAFEGUARDS AND PROMOTES AND SUPPORTS THE SAFEGUARDS INCLUDED IN THE UNFCCC GUIDANCE TO REDD+	152
14.2	DESCRIPTION OF ARRANGEMENTS TO PROVIDE INFORMATION ON SAFEGUARDS DURING ER PROGRAM IMPLEMENTATION.....	158
14.3	DESCRIPTION OF THE FEEDBACK AND GRIEVANCE REDRESS MECHANISM (FGRM) IN PLACE AND POSSIBLE ACTIONS TO IMPROVE IT	158
15.	BENEFIT-SHARING ARRANGEMENTS.....	162
15.1	DESCRIPTION OF BENEFIT-SHARING ARRANGEMENTS	162
15.2	SUMMARY OF THE PROCESS OF DESIGNING THE BENEFIT-SHARING ARRANGEMENTS.....	166
15.3	DESCRIPTION OF THE LEGAL CONTEXT OF THE BENEFIT-SHARING ARRANGEMENTS	166
16.	NON CARBON BENEFITS	167
16.1	OUTLINE THE POTENTIAL NON-CARBON BENEFITS AND IDENTIFICATION OF PRIORITY NON-CARBON BENEFITS.....	167

16.2	APPROACH FOR PROVIDING INFORMATION ON PRIORITY NON-CARBON BENEFITS.....	168
17.	TITLE TO EMISSION REDUCTIONS.....	169
17.1	AUTHORIZATION OF THE ER PROGRAM.....	169
17.2	TRANSFER OF TITLE TO ERS.....	170
18.	DATA MANAGEMENT AND REGISTRY SYSTEMS.....	171
18.1	PARTICIPATION UNDER OTHER GHG INITIATIVES.....	171
18.2	DATA MANAGEMENT AND REGISTRY SYSTEMS TO AVOID MULTIPLE CLAIMS TO ERS	172
	ANNEXES	175
	ANNEX 1: OVERVIEW OF INTERVENTIONS AND ACTIVITIES	175
	ANNEX 2A: SUMMARY OF FINANCIAL PLAN.....	180
	ANNEX 2B: PROGRAMME BUDGET NOTES	181
	ANNEX 2C: INITIAL DISCOUNTED CASH FLOW ANALYSIS	184
	ANNEX 3: REQUEST FOR EXEMPTION AND JUSTIFICATION FOR 2015 REFERENCE PERIOD END DATE.....	188
	ANNEX 4: LETTER OF SUPPORT	189
	ANNEX 5: STAKEHOLDER CONSULTATION.....	190
	ANNEX 6: SAFEGUARDS MEASURES.....	208
	ANNEX 7: METHODOLOGIES FOR ESTIMATING EMISSIONS AND REMOVALS	212
	DEFORESTATION	212
	<i>Emission Factors</i>	212
	<i>Activity Data</i>	216
	ENHANCEMENT	217
	<i>Removal Factors</i>	217
	<i>Activity Data</i>	218
	LEGAL TIMBER HARVESTING	222
	<i>Activity Data</i>	222
	<i>Emission Factors</i>	222
	<i>Illegal Timber Harvest</i>	223
	<i>Activity Data</i>	223
	<i>Emission Factor</i>	224
	<i>Degradation from Fire</i>	224
	<i>Activity Data</i>	224
	<i>Emission Factors</i>	225
	ANNEX 8: SPATIAL ANALYSIS TO IDENTIFY TREE CROPS IN THE GCFRP ACCOUNTING AREA.....	226
	ANNEX 9: LOGGING MEASUREMENT STANDARD OPERATING PROCEDURE TO UPDATE LOGGING EMISSION FACTORS.....	229
	INTRODUCTION AND HOW TO USE THIS DOCUMENT.....	229
	SOP FIELD SAFETY.....	229
	SOP QUALITY ASSURANCE/QUALITY CONTROL.....	230
	<i>Quality Assurance</i>	231
	QUALITY CONTROL.....	231
	<i>Field measurement error estimation</i>	231
	<i>Data Entry quality control check:</i>	232
	FRAMEWORK FOR ESTIMATION OF CARBON STOCK DAMAGE FROM SELECTIVE LOGGING	232
	LOCATING FELLED TREES	232
	CARBON STOCK DAMAGE DUE TO TREE FELLING	232
	MEASUREMENTS ON FELLED TREE:.....	233
	INCIDENTAL DAMAGE MEASUREMENTS:	235
	AREA OF CANOPY OPENING	235
	CARBON STOCK DAMAGE DUE TO LOG EXTRACTION.....	236

TIMBER TREE MEASUREMENTS	239
SKID TRAIL DATA SHEET	240
LOGGINGDECK DATA SHEET	241
ROAD DATA SHEET	241
ANNEX 10: PROPOSALS FOR STEPWISE IMPROVEMENTS.....	243
<i>Deforestation</i>	243
<i>Carbon stock Enhancements:</i>	243
<i>Timber Harvesting</i>	243
<i>Woodfuel Collection</i>	244
<i>Forest fire</i>	245
ANNEX 11: ESTIMATES FOR WOODFUEL EMISSIONS BY DISTRICT	247
ANNEX 12: CAPACITY BUILDING.....	249
TECHNICAL FIELD TRAINING ON ESTIMATING CARBON EMISSIONS FROM SELECTIVE LOGGING.....	249
<i>Training Agenda</i>	249
GENERAL DESCRIPTION.....	251
<i>Training on improved land cover mapping in Ghana for emissions from deforestation and degradation from fire - Identification of cocoa, oil palm & rubber plantations. Training on identifying degradation from fire.</i>	251
<i>Training on reference level/MRV tool.</i>	252

EXECUTIVE SUMMARY

Please provide a short (2-page maximum) description of the proposed ER Programme, highlighting the key characteristics of the ER Programme and the methodological approach applied

Ghana's Cocoa Forest landscape has **one of the highest deforestation rates in Africa**, at **2.9% per annum**. Forest degradation and deforestation across this agro-forest mosaic, which covers 5.9 million ha of Ghana's High Forest Zone, is being driven by continued cocoa farm expansion and other types of agriculture, coupled with a recent up-surge in illegal mining and illegal logging.

Historically, over the past hundred years, degradation and deforestation in Ghana's High Forest Zone (HFZ) were driven by low-yielding, expansive agriculture—predominantly cocoa farming—coupled with the progressive growth of other extractive industries. For much of this time, conversion of forests was not viewed as a problem, but by the mid-nineties it was clear that Ghana's forest reserves were moderately to severely degraded, low-to-no shade cocoa was expanding at the expense of forests and trees, and biodiversity in the landscape had declined precipitously. Concurrent with the loss of forests, Ghana's Cocoa Board and the cocoa private sector also recognized that the country was underperforming in terms of national production, despite the growing area under cocoa.

While the cocoa sector responded with a “High Tech” programme (2000-2010) in an effort to boost yields, little was done to address deforestation and degradation, or the loss of critical ecosystem services. Over the past six years, the scale of these drivers has increased due to: 1) recent declines in cocoa productivity, causing greater expansion; 2) an increase in illegal logging from a growing domestic demand; and 3) an up-surge in illegal, small-scale mining due to market trends, the availability of foreign and local laborers, and landowners giving up unproductive farms for mining. As a result, **the programme's FREL for the period 2000-2015 shows that the area has lost an average of 145,000 ha of forest each year**, and has produced **over 45 million tCO₂e emissions on an annual basis** from the combined effect of deforestation and degradation, and taking into account CSE. Conversion of forests to agricultural land was identified as the primary driver of deforestation—110,000 ha of forests per annum was converted to agricultural land during the reference period and this accounted for 76 percent of deforestation in the programme area. About **a third of this agriculture conversion resulted from cocoa expansion, making it the single most important commodity driver of deforestation in the programme area.**

These numbers signal a worrisome future for Ghana's high forests and its cocoa sector, as well as for the 12 million people who reside in the landscape and rely, in one way or another, on forest resources and cocoa production for their livelihoods. On the other hand, what is highly encouraging is that **Ghana is now prepared to tackle these issues and significantly reduce deforestation and degradation in this landscape through the Ghana Cocoa Forest REDD+ Programme**, which leverages a strong private sector commitment and investment into a climate-smart cocoa production system and Standard, and supported by a suite of policy interventions and reforms.

The GCFRP is a highly ambitious and unique initiative that will be jointly coordinated by the National REDD+ Secretariat at the Forestry Commission and the Ghana Cocoa Board, in partnership with a broad set of private sector, public sector, civil society, traditional authority, and community people. Building from the main interventions laid out in the ER-PIN, the programme's implementation plan is highly detailed and well thought out, following focused brainstorming by technical experts, and

extensive consultations for input and information sharing with key stakeholders and partners at all levels.

The GCFRP is now constructed according to 5 key pillars: A) Institutional Coordination and MRV; B) Landscape Planning within HIAs; C) Implementing Climate-Smart Cocoa to Increase Yields; D) Risk Management and Finance; and E) Legislative and Policy Reforms. The programme will receive oversight from a Joint Coordination Committee and day to day operations will be the responsibility of a Programme Management Unit (PMU) within the NRS. The programme will be implemented in six Hotspot Intervention Areas (HIAs), covering up to 2.5 million ha, to serve as priority areas for immediate and concentrated interventions at the farm to landscape level. Each HIA will be governed by a local governance board of land owners, land users, and community leaders (including minority groups), and a formal consortium of private sector cocoa companies, NGOs and government partners will work together to bring resources and implement activities on the ground.

The GCFRP is a **US\$199 million dollar programme** that over the first five years (2017-2021) **leverages \$140 million dollars of private sector cocoa investment and over \$30 million dollars in GoG support, as well as significant investment from existing or to-be-sought grants.** An initial discounted cash flow analysis of the CSC investment opportunity shows that the GCFRP makes excellent financial sense in addition to climate sense. A conservative **doubling of yield on cocoa farms to 800 kg/ha** (even greater increases are possible and have been demonstrated) will **realize significant benefits to farmers and to the government.** The **IRR** for the project under this scenario is calculated at **over 2,200%** and **the NPV at 10% will be \$1.96 billion** over the first 5 years.

As a 20 year programme, the GCFRP **estimates that it could produce a total of 391 million tCO₂e emission reductions** (following buffer removals), **representing a 43% reduction against the reference level.** Under a prospective contract with the Carbon Fund to cover the first 5 years of implementation (2017-2021), Ghana estimates that it could generate significant reductions in deforestation against its reference level and produce an additional **5.2 million tCO₂e emission reductions to be transacted under the ERPA.** This is a highly ambitious goal given that Ghana will need to reduce its 2015 emissions by 50% to simply reach the reference level. A historical analysis (2000-2015) of deforestation, degradation and carbon stock enhancement across the accounting area was used to develop the programme's FREL based on average annual emissions and removals.

In addition to having a plan for financing and implementing the programme, Ghana also has very strong private sector commitment and investment, as well as remarkable government cross-sectoral, civil society and community-based support to the GCFRP. While the NRS and Cocoa Board are co-components of the programme, participating ministries and agencies include the MLNR, MESTI, EPA, MoFA, and MC. There is also tremendous private sector commitment from some of the most important cocoa and chocolate companies, including Touton, Mondelez, Olam and Armajaro/Ecom. Leading international and national NGOs partners include Solidaridad, SNV, IUCN-NL, IITA, NCRC, IUCN-Ghana, and Arocha-Ghana. Perhaps most importantly, there is strong support and willingness to engage from traditional leaders, communities, and cocoa farmers across the programme area. From a practical standpoint, developing a results-based programme that engages multiple sectors, institutions and agencies represents a significant feat in and of itself for Ghana, and is further evidence that the programme truly does have the high level political commitment and buy-in that is needed.

Tremendous capacity, understanding, and systems have also been built through the country's REDD+ readiness process, as ascertained by an independent self-assessment of Ghana's REDD+ Readiness Phase, and officially established as such upon the endorsement of Ghana's R-package at the 22nd Participants Committee meeting (PC 22) held in Ghana from 26th-30th September 2016.

As a result, the NRS and partners fully understand the existing drivers and barriers to REDD+, particularly in the GCFRP area, and crucial processes are in motion to address critical policy issues, including: perverse tenure and input-supply policies, clarification of carbon rights, adaptation of customary land tenure norms, and revision of legislation to allow Ghana's alternative dispute resolution mechanism to function for REDD+. Furthermore, under the readiness process and through the development of the GCFRP, the NRS has put in place a forest monitoring and MRV system, a safeguards system, and a data management / registry system.

Though Ghana is not likely to sign an ERPA before early 2017, implementation of the GCFRP and its focus on transitioning to a climate-smart cocoa production landscape will begin in three Hotspot Intervention Areas in late 2016, with the FIP, Touton, and SNV taking the lead in different HIAs. The logic and strength of the GCFRP is the core concept that cocoa cannot be sustainably produced and deforestation and degradation drivers cannot be reduced at a project or singular institutional level, which has been the practice to date. Rather, these issues necessitate a large-scale, integrated approach in order to foster the large-scale changes in farming practices and land use decision making required to reduce deforestation and degradation, and to foster the growth of forests and trees in the landscape. Therefore, the move to implement the GCFRP is an effort to use a coordinated landscape approach that targets all stakeholders as a strategy to change the BAU and reduce emissions from the landscape, while producing the world's first ever climate-smart cocoa bean.

List of Acronyms

ADR	Alternative Dispute Resolution
AfDB	African Development Bank
AFOLU	Agriculture Forestry and Land Use
AOP	Annual Operational Plan
BSM	Benefit Sharing Mechanism
BSP	Benefit Sharing Plan
CBD	Convention on Biological Diversity
CCU	Climate Change Unit
CERSGIS	Centre for Remote Sensing and Geographic Information Services
CF	Carbon Fund
CMC	Cocoa Marketing Company
CFMP	Community Forestry Management Project
CGD	Complaints and Grievance Desks
COCOBOD	Ghana Cocoa Board
COP	Conference of Parties
CPESDP	Coordinated Programme of Economic and Social Development Policies
CREMAs	Community Resource Management Areas.
CRIG	Cocoa Research Institute of Ghana
CSA	Climate Smart Agriculture
CSC	Climate Smart Cocoa
CSIR	Council for Scientific and Industrial Research
CSOs	Civil Society Organisations
CSS	Cocoa Sector Strategy
DAs	District Assemblies
EC	Energy Commission
ENRAC	Environment and Natural Resource Advisory Council
ENREG	Environment and Natural Resource Governance
EPA	Environmental Protection Agency
ERPA	Emission Reduction Programme Agreement
ESMF	Environmental and Social Management Framework
FC	Forestry Commission
FCPF	Forest Carbon Partnership Facility

FGRM	Feedback and Grievance Redress Mechanism
FIP	Forest Investment Program
FLEGT	Forest Law Enforcement, Governance and Trade
FORIG	Forest Research Institute of Ghana
FRL	Forest Reference Level
FSD	Forest Services Division
FWP	Forest and Wildlife Policy
FFB	Fresh Fruit Bunches
GADS	Gender in Agriculture Development Strategy
GCFRP	Ghana Cocoa Forest REDD+ Programme
GFPS	Ghana Forest Plantation Strategy
GIS	Geographic Information System
GoG	Government of Ghana
GSD	Geological Survey Department
GSGDA	Ghana Shared Growth and Development Agenda
GSIF	Ghana Strategic Investment Framework
HFZ	High Forest Zone
HIA	Hotspot Intervention Area
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KNUST	Kwame Nkrumah University of Science and Technology
LAP	Land Administration Project
LBC	Licensed Buying Company
LC	Lands Commission
LCDS	Low Carbon Development Strategy
MESTI	Ministry of Environment, Science Technology and Innovation
MLNR	Ministry of Lands and Natural Resources
MODIS	Moderate Resolution Imaging Spectro-radiometer
MOE	Ministry of Energy
MOF	Ministry of Finance
MOFA	Ministry of Food and Agriculture
MoU	Memorandum of Understanding
MRV	Measurement Reporting and Verification
MTR	Mid-Term Report

MTS	Modified Taungya System
NAMA	Nationally Appropriate Mitigation Actions
NCCP	National Climate Change Policy
NCRC	Nature Conservation Research Centre
NDCs	Nationally Determined Contributions
NDPC	National Development Planning Commission
NFMS	National Forest Monitoring System
NFPDS	National Forest Plantation Development Strategy
NGOs	Non-Governmental Organisations
NHCs	National House of Chiefs
NREG	Natural Resource and Environmental Governance
NREG-TA	Natural Resource and Environmental Governance Technical Assistance
NRS	National REDD+ Secretariat
NRWG	National REDD+ Working Group
NTFPs	Non Timber Forest Products
PBC	Produce Buying Company
PF	Process Framework
PMP	Pest Management Plan
PMU	Programme Management Unit
QA	Quality Assurance
QC	Quality Control
REDD	Reducing Emissions from Deforestation and Forest Degradation
REL	Reference Emission Level
RL	Reference Level
RMSC	Resource Management Support Centre
RPF	Resettlement Policy Framework
RSPS	Roundtable for Sustainable Oil Palm
SDGs	Sustainable Development Goals
SESA	Strategic Environmental and Social Assessment
SIS	Safeguards Information System
SLM	Sustainable Land Management
SOP	Standard Operating Procedures
SRI	Soil Research Institute
TA	Traditional Authorities

TCC+	Technical Coordinating Committee – Plus
TIFs	Tree Information Forms
UNCCD	United Nations Convention to Combat Desertification
VCS	Verified Carbon Standard
VPA	Voluntary Partnership Agreement
WD	Wildlife Division
WRC	Water Resources Commission

1. ENTITIES RESPONSIBLE FOR MANAGEMENT & IMPLEMENTATION OF ER PROGRAM

1.1 ER Programme entity that is expected to sign the Emission Reduction Payment Agreement (ERPA) with the FCPF Carbon Fund

Name of entity	Ministry of Finance
Type and description of organization	MoF is the Ministry with the authority to sign economic agreements with external entities. It is the sector Ministry to which the Cocoa Board answers and it is the Chair of the Technical Coordinating Committee – Plus (TCC+), which oversees the Natural Resource and Environmental Governance programme that is linked to the REDD+. MoF will be responsible for the high level financial administration of the programme.
Main contact person	Franklin Ashiadey
Title	Director, REAL Sector
Address	P.O. Box MB40 Accra- Ghana
Telephone	+233-244689819
Email	fashiadey@yahoo.com
Website	www.mofep.gov.gh

1.2 Organization(s) responsible for managing the proposed ER Programme

Same entity as ER Programme Entity identified in 1.1 above?	No
If no, please provide details of the organizations(s) that will be managing the proposed ER Programme	
Name of organization	Forestry Commission of Ghana
Type and description of organization	Forestry Commission (FC) is the government institution responsible for the sustainable management of Ghana's forest and wildlife resources. The Climate Change Unit of the FC was established in 2007 with a mandate to manage forestry-sector initiatives related to climate change adaptation and mitigation, including REDD+. It hosts the National REDD+ Secretariat, which is responsible for coordinating Ghana's REDD+ process. The sector ministry for the FC is the Ministry of Lands and Natural Resources (MLNR). In partnership with Ghana's Cocoa Board, the FC will take responsibility for this programme, including its design, management, and implementation.
Organizational or contractual relation between the organization and the ER Programme Entity identified in 1.1 above	Both institutions are agencies of government, instituted by law. The FC resides under the MLNR and is responsible for the management of Ghana's forest estates. The MoF manages the government's central budget and fund allocations. The FC and the GCFRP will be resourced financially through the MoF. The two institutions are part of the National REDD+ Working Group, which serves as the principal decision-making body on Ghana's REDD+ process.

Main contact person	Mr. Yaw Kwakye
Title	Head, Climate Change Unit; REDD+ Focal Point, National REDD+ Secretariat
Address	P.O. Box MB 434, Accra, Ghana
Telephone	+233 302 401210 / 401216 / 401227
Email	ykwakye.hq@fcghana.org ; beemayaw@gmail.com
Website	www.fcghana.org

1.3 Partner agencies and organizations involved in the ER Programme

Please list existing partner agencies and organizations involved in the design and implementation of the proposed ER Programme or that have executive functions in financing, implementing, coordinating and controlling activities that are part of the proposed ER Programme. Add rows as necessary.

Name of partner	Contact name, telephone and email	Core capacity and role in the ER Programme
<i>Ghana Cocoa Board (COCOBOD)</i>	Mr. Kissiedu Kwapong, Deputy Director, Research, Monitoring and Evaluation Department Tel: +233 243653841 Email: kissiedukwapong@yahoo.com	Ghana Cocoa Board is a co-proponent of this programme with the Forestry Commission and together they co-lead the programme. As the government institution responsible for the regulation and management of the cocoa sector, it has the full authority and capacity to do so. Cocoa Board serve as the co-chair, with the Forestry Commission, of a coordination and management committee constituted to lead the design and implementation of the programme
<i>Ministry of Lands and Natural Resources (MLNR)</i>	Musah Abu Juam, Technical Director for Forestry Tel: +233-244362510 Email: abujuam@gmail.com	MLNR is the sector Ministry to which the Forestry Commission reports. It is also responsible for the Ghana's Forest Investment Programme (FIP). MLNR will serve on the programme's Coordination and Management Committee to ensure integration and synergy with FIP projects and related activities. As such, it will play a major role in coordinating, managing and implementing the programme.
<i>Ministry of Environment, Science and Technology (MESTI)</i>	Peter Dery Deputy Director, Climate Change Sustainability Email: peterjdery@yahoo.com	MESTI is the sector ministry with responsibility to formulate, develop, implement, monitor and evaluate environmental policies in Ghana, including the National Climate Change Policy. MESTI has a seat on the NRWG and is a key partner on all aspects of REDD+.
<i>Ministry of Food and Agriculture (MOFA)</i>	Osei Akoto Director of Crops Services Tel: +	MOFA is represented on National REDD+ Working Group (NRWG) and will be responsible for ensuring that extension

	Email:	services and interventions related to food and cash crops including oil palm and citrus align with the goals of Ghana's Cocoa Forest REDD+ Programme.
<i>Environmental Protection Agency (EPA)</i>	Daniel Benefor Tutu Principal Programme Officer Tel: +233-246114652 Email: dbenefor2000@yahoo.com	EPA is the National Focal Point for Climate Change and is responsible for all National Communication to the UNFCCC. EPA will ensure that the programme's accounting is reflected in the national accounting. It also hosts Ghana's Climate Change Data Hub, which will support elements of data management and registry.
<i>Minerals Commission</i>	Emmanuel Afreh Tel: +233-240936688 Email: efreh@hotmail.com	The Minerals Commission (MC) is the government institution responsible for the regulation and management of Ghana's mineral resources. Its sits under the MLNR.
<i>Forestry Research Institute of Ghana (FORIG)</i>	Dr. Ernest Foli Principal Scientist Tel: +233 262714148 Email: efoli@hotmail.com ; egfoli@gmail.com	FORIG is a research institute under the Council for Scientific and Industrial Research (CSIR) conducting forest and forest products research for social, economic and environmental benefits of society. FORIG will advise the JCC and provide technical guidance on the implementation of field activities and development of appropriate systems for the success of the programme.
<i>Cocoa Research Institute of Ghana (CRIG)</i>	Dr. Gilbert Anim-Kwapong Executive Director Tel: +233-244983278 Email: gjanimkwapong@yahoo.com	CRIG is a subsidiary of Ghana Cocoa Board established as a centre of excellence for developing sustainable, cost effective, socially and environmentally acceptable technologies for the cocoa industry. CRIG is responsible for all cocoa research that provides information and advice on matters relating to the production of cocoa and other mandate crops
<i>National House of Chiefs</i>	Nana Frimpong Anokye Ababio II Paramount Chief for Agona Ashanti Tel:+233-244419905 Email: isaacberko@yahoo.com	The National House of Chiefs is a body of elected representative from Ghana's Regional Houses of Chiefs that is recognized by the Constitution. It is charged to advice on issues related to culture and chieftaincy, and work towards the codification of customary law. The national house of chiefs will work with the programme to liaise with Paramount chiefs that have jurisdiction over landscapes within the programme area. They are expected to play critical role in the implementation of a Grievance Redress Mechanism and will also provide guidance on issues related to benefit sharing.
<i>Touton</i>	Charles Tellier Country Manager	Touton is a cocoa bean trading company that works with the largest licensed buying

	Tel: +233-266255519 Email: c.tellier@touton.com	companies in the country, produce buying company (PBC). Touton has started to implement the first comprehensive CSC programme, in line with this programme, for cocoa farms in Ghana. The programme will build on Touton's initiative, which cover 2 main HIAs.
<i>Mondelez</i>	Yaa Peprah Agyeman Amekudzi Country Lead, Cocoa Life Email: yaa.amekudzi@mdlz.com Tel: +233-244289718	In Ghana, Mondelēz International is leading chocolate company supporting cocoa sustainability initiatives on the ground with cocoa farmers and cocoa farming communities. It will be a key stakeholder leading HIA Consortiums and CSC implementation.
<i>Produce Buying Company (PBC)</i>	Kojo Atta Krah Managing Director +233-208180350	PBC is one of the biggest licensed cocoa buying companies (LBC) in Ghana, and has the greatest geographical presence, being present in every village/society.
<i>Olam</i>	Eric Botwe Business Head, Cocoa Tel: +233-244329508 Email: eric.botwe@olamnet.com	Olam is a leading LBC and cocoa processor that purchases cocoa beans for Ghana Cocoa Board on commission basis. Olam is currently funding and engaged in multiple projects with cocoa farmers including certification, farmer business schools and farmer data management. Olam will play a lead role in implementing this programme in HIAs on the ground with cocoa farmers.
<i>Armajaro / Ecom Ghana Ltd</i>	Victus Dzah Tel: +233-244312158	Armajaro Ghana / Ecom is one of the leading LBCs and cocoa processors in Ghana. It has numerous sustainability initiatives including Geo-Traceability, which tracks beans along the supply chain, and Source Trust, which brings benefits back to farmers and farming communities.
<i>Solidaridad West Africa</i>	Isaac Gyamfi Managing Director PMB KD 11 Kanda-Accra Tel: +233-544323960 Email: Isaac.gyamfi@solidaridadnetwork.org	Solidaridad West Africa leads implementation of the UTZ Certification standard for cocoa, it is a major partner to the Cocoa Board in replanting and rehabilitating old farms, and it is also active in the Roundtable for Sustainable Oil Palm (RSPS) in Ghana. Solidaridad will be key in implementing activities on the ground in the programme's target landscapes.
<i>Nature Conservation Research Centre(NCRC)</i>	John Mason CEO PO Box KN925, Kaneshie, Accra Tel: +233-264697485 Email: jos091963@gmail.com	Nature Conservation Research Centre (NCRC) is a continental leader in REDD+ and Climate Smart Agriculture, and has played major role to date on both issues in Ghana. It also has extensive expertise in implementing Community Resource Management Areas (CREMAs). NCRC would be a key partner in implementing activities on the ground in the

		programme's target landscapes.
<i>IUCN – Ghana</i>	Saadia Bobtoya Owusu- Amofah Project Coordinator Mob: +233(0)0264893004 Email: saadia.bobtoya@iucn.org	IUCN Ghana will serve as an implementation partner with its extensive experience in CREMA development, sharing lessons learned from its on-going REDD+ projects on benefit sharing, extension, and communication strategies that are pro-poor and gender focused.
SNV	Reuben Ottou Senior Advisor Climate change and REDD+ +233244893528 Email:rottou@snvworld.org	A key partner of the programme, SNV is leading the development of a country led approach on Safeguards Information Systems and is testing models for developing “low emission development plans” in districts within the GCFRP landscape. These projects also involve the piloting of participatory forest and agroforestry practices.
<i>Arocha Ghana</i>	Daryl E. Bosu Deputy National Director - Operations Tel: +233 (0)20-2555727 Email: daryl.bosu@arocha.org	Arocha Ghana is an NGO that has a strong focus within the GCFRP area on the landscape surrounding the Atewa Forest Reserve Range. Arocha will be a key implementation partner in this HIA landscape, where it has expertise in community-based conservation, ecosystem services and restoration activities.
<i>International Institute of Tropical Agriculture (IITA)</i>	Dr. Richard Asare Senior Scientist Tel: +233-243653504 Email: r.asare@cgiar.org	IITA is a leading international research organization focused on agriculture and tree crop systems with a regional office in Ghana. Through its CCAFS project and agroforestry research agenda, IITA will be a key stakeholder engaged in research and development activities that support CSC practices and implementation, particularly with respect to best practice guidelines and climate change adaptation.
<i>Verified Carbon Standard (VCS)</i>	Toby Janson-Smith Chief Innovative Officer Tel: +12024802282 Email: tjanson@v.c.s.org	VCS provides technical support to ensure that the programme influences and benefits from existing and new international landscape standards, requirements, global best practice. VCS will provide capacity on new, innovative and trusted carbon accounting tools and standards including REDD methodologies.
<i>IUCN-Netherlands</i>	Jan Willem den Besten Senior REDD+ Program Manager Tel: +31 681498173 Email: janwillem.denbesten@iucn.nl	IUCN- Netherlands is supporting the implementation of Community Resource Management Areas (CREMAs) in multiple regions of the country, including areas within the program's landscape. IUCN-NL is also supporting the program in linking to international chocolate companies and cocoa buyers to support CSC and a Ghana Cocoa Standard.

2. STRATEGIC CONTEXT & RATIONALE FOR THE ER PROGRAMME

2.1 Current status of the Readiness Package and summary of additional achievements of readiness activities in the country

Indicate the current status of the Readiness Package. Provide information when the Readiness Package was endorsed by the FCPF Participants Committee, and if applicable provide a brief update on REDD+ readiness activities that have taken place since this endorsement. Please reference all relevant supporting information and provide links.

Ghana's R-Package received endorsement during the 22nd Participants' Committee meeting (PC22) of the FCPF held in Accra, Ghana in September, 2016. The independent self-assessment carried out on Ghana's REDD+ Readiness Phase indicated that Ghana had made significant progress under the REDD+ process. The assessment was guided by the FCPF Readiness Assessment Framework. Table 1, below, gives an overview of the overall assessment indicating significant progress and major achievements as highlighted in the independent assessment document.

As specified in the FCPF Readiness assessment guidelines, a colour-coded system was used to assess progress on each of the questions. A summary score is presented at sub component level based on the responses and scores of questions for each of the sub-components that were received from different stakeholder groups. Overall, the assessment identifies 6 green, 2 yellow and one orange. This represents a solid improvement since the Mid-Term Report (MTR) undertaken in 2014, which identified only one green, 7 yellow, and one red score.

Table 1: R-Package progress summary

R-Package Component / Sub-Component	Assessment Criteria	Assessment Score	Assessment Summary
1. Readiness Organisation and Consultation			
1a. National REDD+ Management Arrangements	<ol style="list-style-type: none"> 1. Accountability and transparency 2. Operating mandate and budget 3. Coordination with national or sector policy frameworks 4. Technical supervision capacity 5. Funds management capacity 6. Feedback and grievance redress mechanism 		Generally, there is good progress in terms of the institutional arrangements, accountability and transparency, cross-sectoral co-ordination, technical supervision, staffing and funds management. More work is needed to ensure that funding in the medium to long term is assured and that relevant ministries are fully engaged. Attention is also needed towards the operationalization of the Feedback and Grievance Redress Mechanism
1b. Consultation, Participation, and Outreach	<ol style="list-style-type: none"> 7. Engagement of key stakeholders 8. Consultation process 9. Information sharing 10. Implementation of consultation outcomes 		Excellent progress has been made in delivering a thorough communication campaign through a range of channels, and ensuring widespread consultation and participation in the design of key aspects of REDD+ readiness. Information has been shared widely and the inputs of consultative exercises are used to inform and strengthen the development of plans and proposals being developed at the national level.
2. REDD+ Strategy Preparation			
2a. Assessment of Land Use, Land Use Change Drivers, Forest Law, Policy, and Governance	<ol style="list-style-type: none"> 11. Assessment and analysis 12. Prioritization of direct and indirect drivers 13. Links between drivers and REDD+ activities 14. Actions plan to address natural resource rights, land tenure, governance 15. Implications for forest law and policy 		Overall assessment of land use and land use change drivers was thorough and built extensively on earlier efforts. The process of developing the REDD+ Strategy encountered some initial setbacks, which have been addressed following concerted inputs from other stakeholders which have led to a more robust version of the document. The linkages between drivers and strategy options are clear and logical. There are on-going efforts to address some of the unresolved issues relating to tree tenure, benefit sharing, livelihoods etc.
2b. REDD+ Strategy Options	<ol style="list-style-type: none"> 16. Presentation and prioritization of strategy options 17. Feasibility assessment 18. Consistency with policies 19. Integration with relevant strategies and policies 		The strategy options were selected through a participatory and inclusive process and the direct incorporation of the SESA process meant that options were subjected to an analysis of potential positive and negative impacts and where necessary these could be mitigated. Emission reduction potential was not comprehensively captured in the National REDD+ Strategy process, but has been well elaborated in the Cocoa

			Landscape Emissions Reduction Programme Document
2c. Implementation Framework	<ul style="list-style-type: none"> 20. Adoption of legislation and regulations 21. Transparent and equitable framework 22. National REDD+ information system or registry 		<p>Good progress has been made in influencing key national policy development processes but these are yet to be translated into legally binding laws. More work is needed to clarify carbon and tree tenure, to agree on a final model for benefit sharing as well as REDD+ financing arrangements. Although multiple benefit sharing systems currently operate in the forest and wildlife sectors, these have yet to be tested for REDD+. The REDD+ Registry / Data Management System is not yet operational but terms of reference have been developed and the procurement is coming to completion.</p>
2d. Social and Environmental Impacts	<ul style="list-style-type: none"> 23. SESA coordination and integration arrangements 24. Analysis of safeguard issues 25. REDD+ strategy design with respect to impacts 26. Environmental and social management framework 		<p>A thorough process was used for identifying potential impacts and risks associated with REDD+ related activities. Where significant negative impacts were identified, activities were either modified, removed or mitigation actions developed to reduce potential downstream impacts. As results based actions through REDD+ have yet to commence, the ESMF is yet to be operationalized.</p>
3. Reference Emissions Level / Reference Levels			
	<ul style="list-style-type: none"> 27. Clear, step-wise methodology 28. Historical data and adjustment for national circumstances 29. Consistency with UNFCCC/IPCC guidance and guidelines 		<p>Significant work has been done on the REL/RL that builds on previous support including a major investment from the Japanese government. Additional funding was provided from FCPF following the MTR that allow for completion of REL work at both national and sub-national level (within the GCFRP). The final product meets the requirements under IPCC and UNFCCC methodological guidance</p>
4. Monitoring Systems for Forests and Safeguards			
	<ul style="list-style-type: none"> 30. Documentation of step-wise approach 31. Demonstration of early implementation 32. Institutional arrangements and capacities 		<p>The NFMS is yet to be operational, but is closely linked to the design of the REL and will follow the same methodology. The system is in line with latest international thinking and meets IPCC/UNFCCC standards. The design will be able to measure deforestation, degradation and enhancement of carbon stocks. Clear roles and responsibilities have been agreed regarding the operations of the NFMS. However, the system will require significant running</p>

			costs, institutional support and capacity and none of these parameters have been fully tested.
5. Information System for Multiple Benefits, Other Impacts, Governance and Safeguards			
	33. Identification of non-carbon aspects. 34. Monitoring and reporting capabilities 35. Information sharing		Good progress shown with regard to producing a SESA and ESMF, but it has not been operationalized as the REDD+ implementation is yet to start. Plans are at an early stage with regard to the development of a safeguards information system (SIS) with a view to complying fully with UNFCCC requirements.

	Significant progress achieved
	Progressing well, but further progress required
	Further development required
	Not yet demonstrating progress

As Ghana transitions from completing readiness to implementation, she will continue to make progress in addressing those areas that need improvement and in responding to the concerns and questions that were identified during the self-assessment. The NRS has put in place a plan and is making progress toward full completion of readiness in line with the roll-out of the GCFRP. Details about these next steps and a description of progress since the self-assessment is noted below:

- **More work is needed to ensure that funding in the medium to long term is assured:** The Ghana Cocoa Forest REDD+ Programme (GCFRP) now has a solid financial plan that outlines a broad range of funding sources, including investment from the private sector, REDD+ funding in the form of grants (readiness and FIP) and performance-based payments (Carbon Fund), contributions from NGOs and other partners (grants), and Government of Ghana (GoG) support. Overall, the estimated funding gap is very **small** and Ghana is confident that this can be filled. With respect to the national level and other programmes outlined within the REDD+ Strategy, the GoG will continue to support key programmes and activities that align with REDD+.
- **Relevant ministries are fully engaged:** Through the design of this programme and its plan for implementation, the specific roles and responsibilities of various stakeholders, including that of other ministries and commissions has become more tangible. At a high level, a broad range of ministries are already members of the National REDD+ Working Group (NRWG), and specific roles have also been clarified, including that of the Environmental Protection Agency (EPA), under the Ministry of Environment, Science, Technology and Innovation (MESTI), as being responsible for hosting and operating Ghana’s Climate Change Data Hub (data management and registry system). The role of the Minerals Commission (MC) is also coming into focus as part of the interventions to tackle illegal mining.
- **Operationalization of the Feedback and Grievance Redress Mechanism (FGRM):** A proposal for the design of the FGRM was completed under an earlier consultancy in late 2014 and the development of operational modalities for its full implementation is currently underway. This assignment is expected to be completed **by the end of** 2016. It is proposed that the FGRM should be operated using a bottom-up approach and hence, the “Complaints and Grievance Desks” (CGD) are being set up at the offices of the Forestry Commission (FC) starting from the districts within the Emission Reduction Programme (ERP) accounting area. Concerns from aggrieved stakeholders will be received, processed and collated at this level and channelled to the FGRM desk at the national level through the regions. A series of training activities have been planned for persons designated to be responsible for the CGD at the districts and the regions. Efforts are being made to link the FLEGT/VPA system for conflict resolution to the FCPF-sponsored FGRM to reduce costs and increase linkages between these two

important but inter-linked approaches to improving forest governance. Steps have been initiated to seek an amendment to the Alternative Dispute Resolution (ADR) Act 798 of 2010 to include resolution of environmental issues, which the current law does not technically allow for, but has been occurring already in practice.

- **Operationalization of REDD+ Registry:** The NRS is finalizing the procurement process for consultants to develop a data management system / registry for the ERP and this assignment is expected to be completed by **early 2017**. This data information system will collect information about partners, activities, and specific geographical locations where interventions are expected to be implemented. It will also incorporate data from forest monitoring, safeguards, and key implementation criteria that inform understanding of impacts and benefit sharing. All information collected into this system will be uploaded into Ghana's national Climate Change Data Hub, operated by EPA, which will serve as a transparent repository of key information.

Table 2: List of key readiness studies and documents and the web links

Readiness studies/documents	Web links
Independent Evaluation of REDD+ Readiness at Mid-Term	https://www.forestcarbonpartnership.org/sites/fcp/files/2014/May/Independent_Evaluation_of_REDD_Readiness_Ghana.pdf
Development of REDD+ Communication Strategy	https://www.forestcarbonpartnership.org/sites/fcp/files/2015/April/REDD%20%20Comm%20Strat%20Final%20Doc.pdf
High Level Engagement with Private Sector and State Actors on the Emission Reduction Programme	http://fcghana.org/userfiles/files/REDD%2B/High-Level%20Buy-In%20-%20Final%20Report.pdf
Establishment of Benefit Sharing	http://fcghana.org/userfiles/files/REDD%2B/Final%20Report%20REDD%2B%20Benefit%20Sharing%20Ghana.pdf
Development of Measurement, Reporting and Verification System	http://fcghana.org/userfiles/files/REDD%2B/Ghana%20MRV%20Final%20Report%20(ID%2067024).pdf
Environmental and Social Management Framework (ESMF)	http://fcghana.org/userfiles/files/REDD%2B/final%20%20ESMF%20REDD%2B_oct%202014.pdf
Resettlement Policy Framework (RPF)	http://fcghana.org/userfiles/files/REDD%2B/final%20RPF-REDD%2B-oct%202014(1).pdf
Development of Strategic Environmental and Social Assessment (SESA)	http://fcghana.org/userfiles/files/REDD%2B/FINAL%20SESA%20report-18122014.pdf
Development of Dispute Resolution Mechanism (GRM)	http://fcghana.org/userfiles/files/REDD%2B/Final%20final%20DRM%20Report.pdf
Development of REDD+ Strategy	www.forestcarbonpartnership.org/sites/fcp/files/2015/April/Ghana%20National%20REDD%2B%20Strategy%20Final.pdf
Development of an Integrated M&E Framework	https://www.forestcarbonpartnership.org/sites/fcp/files/2015/April/M%26E%20Final%20Draft_March_2014.pdf

2.2 Ambition and strategic rationale for the ER Programme

Please describe the ambition and strategic rationale for the proposed ER Programme. Describe the ambition and significance of the ER Programme in relation to the total forest-related emissions and removals in the country (please note that a detailed description of the estimation of the ERs expected from the ER Programme is included in section 13, here describe the relative importance of the ER Programme compared to the overall

emissions and removals in the country).

Describe how the ER Programme is consistent with national policies and development priorities and will contribute to the development and/or implementation of components of REDD+, specifically the current national REDD+ strategy through the implementation of a variety of interventions.

*Refer to **critterion 1** of the Methodological Framework*

Ambition and Significance

For nearly a century, degradation and deforestation in Ghana’s High Forest Zone (HFZ) were largely driven by low-yielding, expansive agricultural practices—predominantly cocoa farming—coupled with the progressive growth of other extractive industries, like timber production, as well as the illegal practices that tend to accompany them. For much of this time, conversion of forests was not viewed as a problem, but by the mid-nineties it was increasingly clear that Ghana’s forest reserves were moderately to severely degraded¹, low/no shade cocoa was expanding at the expense of forests and trees², and biodiversity in the HFZ landscape had declined precipitously³. Concurrent with the loss of forests, Ghana’s Cocoa Board and the cocoa private sector also recognized that the country was underperforming in terms of national production, despite the growing area under cocoa.

While the cocoa sector responded with a high tech programme in an effort to boost yields, little was done to address deforestation and degradation. As a result, during the decade from 2000-2010 deforestation across the cocoa-forest landscape continue at a rate of approximately 1.7% per annum. More recently, drivers continue to include the expansion of cocoa farms and other tree crop farms, the loss of trees in these farming systems, illegal logging and illegal chainsaw operations, and illegal mining, as originally documented in Ghana’s R-PP⁴ and described in the National REDD+ Strategy⁵. Unfortunately, over the past six years, the scale of these drivers has increased due to declining cocoa productivity (causing greater expansion), an increasing demand for domestic timber, and an upsurge in illegal mining and illegal logging. Due to these changes, it is now estimated that over the past 15 years, Ghana’s deforestation rate has jumped to 2.9% per annum, and that approximately 145,625 ha of forest are lost each year; forests which are critical to sustaining Ghana’s cocoa sector through the provisioning of multiple ecosystem services, as well as the conservation of biodiversity.

In response to the opportunities that have opened up with REDD+ readiness, and in a serious and strategic move to significantly reduce deforestation and degradation across the cocoa forest mosaic landscape, Ghana initiated a sub-national programme in 2014 that aims to reduce emissions through the implementation of a “climate-smart cocoa” programme and sustainability standard, coupled with additional activities in priority areas to reduce the impacts from other drivers. While similar in some ways to a Jurisdictional REDD+ approach, this programme aligns with the main cocoa production landscape and follows the ecological boundaries of the core of the High Forest Zone (HFZ) (5.9 million hectares).

What makes this programme unique in Africa and a global first in the cocoa sector is its goals to produce emission reductions and sustainable, climate-smart cocoa beans from the landscape. By

¹Hawthorne, W.D, Abu-Juam, M. (1995) Forest Protection in Ghana (with particular reference to vegetation and plant species). [doi:IUCN, Gland, Switzerland and Cambridge, U.K](https://doi.org/10.1017/S002229330000551)

²Robert, A. Rice and Russell Greenberg 2000. Cacao Cultivation and the Conservation of Biological Diversity. *Ambio* Vol. 29 No. 3, Royal Swedish Academy of Sciences 2000. <http://orton.catie.ac.cr/repdoc/A3565i/A3565i.pdf>

³Hansen, C.P. and Treue, T. 2008. Assessing illegal logging in Ghana. *International Forestry Review* (2008) Volume: 10, Issue: 4, Pages: 573-590. https://www.researchgate.net/publication/232685551_Assessing_illegal_logging_in_Ghana

⁴GoG 2010. Readiness Preparation Proposal (R-PP): Revised Ghana R-PP. Accra, Ghana

⁵GoG 2015 National REDD+ Strategy. http://www.fcghana.org/userfiles/files//REDD+/Ghana's_National_REDD_Strategy_final_draft_210616.pdf

capturing the long ignored environmental externalities from cocoa production (as well as other agricultural and natural resource commodities) into the cost of producing a cocoa bean, while demonstrating emission reductions and compliance with safeguards, Ghana's cocoa sector and private sector companies along the value chain can claim and sell a *truly* sustainable, REDD+, climate-smart product. In rolling out this programme and implementing a Ghana Climate-Smart Cocoa Standard, the aim is to significantly increase farmers' yields through the delivery of improved and expanded access to agronomic resources and other livelihood benefits for more than 6 million rural farmers and forest users, while enhancing resilience to climate change and ensuring the sustainability of supply.

However, given the programme area's average annual emissions over the past 15 years and the increasing rate of emissions⁶ in the landscape, the GCFRP is highly ambitious in its goal to significantly reduce deforestation against its 2015 emissions and then subsequently produce 5,287,500 tons of CO₂e emission reductions across the cocoa forest mosaic landscape (post removal of buffer) over the 5 year ERPA period. Over the full life of the programme (2017-2037), the GCFRP aims to curb escalating deforestation and degradation and reduce total emissions over the lifetime of the programme by approximately 395 MTCO₂e.

The programme's ambition is also evident in its unique and special focus on a global commodity—cocoa—and the plan to implement using a cross-sector coordination approach that leverages over US\$ 140 million in public-private initiatives and investments in target areas of the programme's landscape, to facilitate a significant financial return to farmers and the government, in addition to climate benefits. In effect, this means that the programme's co-benefits—including significantly increased yields for farmers, improved tree tenure arrangements and conservation of threatened biodiversity—elevate its value far beyond that of the carbon benefit.

National Policies and Development Priorities

What makes this programme highly promising is that its ambition is underpinned by a set of new and important policies focused on climate change, low emissions development, and sustainable environmental and natural resource management. Of even greater importance is that the GCFRP presents a clear pathway for implementing and realizing the goals of these policies, at both national and sector levels. Much of the impetus behind these new policies is that the GoG recognizes that climate change and environmental degradation are already negatively affecting the country in myriad ways⁷ ⁸ and that they are likely to continue to hamper Ghana's environmental and socio-economic prospects in the coming decades if changes are not made. As a result, one of the main goals of the National Climate Change Policy (NCCP) (2012) is to design and implement interventions that increase carbon sinks through improved governance structures, securing forests and natural ecosystems for the maintenance of their ecosystem services and biodiversity, plantation development, and the conservation of trees in farming systems through agroforestry practices. All of these types of interventions are reflected in the GCFRP.

Following the NCCP, Ghana also initiated its Low Carbon Development Strategy (2013), for which the overall objective is to contribute to global climate change mitigation by providing a framework that will ensure climate resilient, equitable, low-emission economic growth and sustainable

⁶ See Annex 1.

⁷ In 2014, it was estimated that the total economic cost of poor environmental management is about 10% of Ghana's GDP (GoG, 2014. Medium Term National Development Policy Framework: Ghana Share Growth Development Agenda (GSGDA); 2014-2017. National Development Planning Commission (NDPC), Policy Framework Volume II). <https://s3.amazonaws.com/ndpc-static/publication/GSGDA+II+2014-2017.pdf>

⁸ Anim-Kwapong, G.J. and Frimpong, E.B. (no date) Vulnerability of agriculture to climate change. Cocoa Research Institute of Ghana. www.nlcip.net/fileadmin/NCAP/Countries/Ghana

development, while prioritizing poverty reduction in a cost-effective manner. The GCFRP is also directly aligned with this strategy and will be an important initiative to achieve these goals.

Ghana's Nationally Determined Contributions (NDC), which stem from these two policies, clearly recognizes REDD+ and the GCFRP in particular as one of the leading areas for generating national emission reductions in the medium term, following the conclusion of Ghana's ERPA with the CF. In fact, the GCFRP is widely viewed as being well positioned to catalyze key actions and investments on the ground to bring about many of the needed changes and performance based results for mitigation as well as adaptation priorities.

At a national level, in addition to these two policies and Ghana's NDC, the GCFRP also aligns with Ghana's Shared Growth and Development Agenda II (2014-2017), Ghana's Environment Policy (2012), and the adoption of the Sustainable Development Goals 13 (to take urgent action to combat climate change and its impacts) and 15 (to protect, restore and promote sustainable use of terrestrial ecosystems, sustainably managed forests, combat desertification, reverse land degradation, and halt biodiversity loss).

One of the most exciting and transformative aspects of the GCFRP is that with respect to key sectors, the GCFRP has not only influenced the *development* of policies, but it is also specifically designed to *facilitate their roll-out* to achieve changes in land-use decision making and resource management on the ground.

For example, as a result of the process to develop and design the programme, in which the Cocoa Board has been designated as a co-implementation agency with the FC (the first time the two institutions are collaborating), Ghana's draft Cocoa Sector Strategy II, which is awaiting validation, gives a clear demonstration of the Cocoa Board's commitment to promoting environmental sustainability by reducing deforestation and degradation in cocoa growing areas. The strategy document prioritizes the implementation of a climate-smart cocoa production system and standard to be implemented in partnership with the private sector and in line with the country's REDD+ goals. In particular, the strategy is focused on promoting practices that increase yields and incomes, build resilience and adaptation to climate change, reduce emissions in the cocoa growing landscape, and lead to the integration of shade trees on-farms. The strategy also outlines plans to mainstream gender issues across the value chain, to implement a "Youth in Cocoa" initiative to support the next generation of cocoa farmers, and to address illegal mining in cocoa growing lands.

The Cocoa Sector Strategy I, which spanned 2000-2010 was the main reason that Ghana's Cocoa Board was so successful in increasing yields from 350,000 tons at the turn of the century to a national production high of 1 million tons in 2011, and it is widely believed that the Cocoa Sector Strategy II will play an equally important role in enabling the successful implementation of the GCFRP, including work that is underway to develop a Ghana standard for sustainable and climate-smart cocoa production. In fact, Cocoa Board is now considering the establishment of a Climate Change Unit which would be directly responsible for this programme and its activities, as well as other key initiatives to address threats from climate change.

The REDD+ readiness process also had a significant influence on the formulation of Ghana's 2012 Forest and Wildlife Policy (FWP), and as the MLNR and the FC now move to design implementation measures and legal instruments, the GCFRP is playing a central role in influencing their design and catalyzing momentum to authorize piloting/testing and ultimately the passage of legislation. For example, tree tenure reforms have been discussed in Ghana for over twenty years with little change, but as a result of this programme and the FIP, reform options have now been recommended and

agreements are coming together to enable the piloting of new tree tenure arrangements within the programme landscape.

A key natural resource management mechanism that has been greatly expanded in its scope by REDD+ and supports the devolution of management rights to communities—CREMA—is also positioned to receive full legislative backing under the law through the passage of the Wildlife Resource Management Bill, which is currently before Parliament. Ensuring the passage of this legislation is a top priority for the GCFRP as it will be a critical instrument for implementing the GCFRP on the ground in many locations. The advent of REDD+ and the programme has also influenced the context of the National Forest Plantation Development Strategy (NFPDS) which is the blueprint to guide extensive reforestation and afforestation programmes in the country, and will target areas within the GCFRP landscape.

Of critical importance is that the GCFRP has also initiated the integration and co-implementation of other forestry programmes, including the Forest Law Enforcement, Governance and Trade (FLEGT) Initiative (as part of the Voluntary Partnership Agreement (VPA)), and the overlapping projects under Ghana's FIP. While the synergies were broadly recognized, the GCFRP is the first time that a plan has been put in place to leverage these complementary channels for addressing the major drivers of deforestation and degradation in the ER Programme landscape, and for moving forward in a performance-based and climate-smart manner.

More broadly, other sector level policies which the programme complements and aims to help implement include the Gender in Agriculture Development Strategy II (2016), the National Wildfire Policy, the National Tree Crops Policy, the National Climate Smart Agriculture and Food Security Action Plan (2016-2020), the National Buffer Zone Policy (2014), the draft National Bioenergy Policy, and the Ghana Strategic Investment Framework (GSIF) for Sustainable Land Management (SLM) (2009 – 2015). More information about these policies can be found in Ghana's National REDD+ Strategy (See Table 2 for link).

Contribution to REDD+ and National REDD+ Strategy

The vision of Ghana's National REDD+ Strategy is to significantly reduce emissions from deforestation and forest degradation, while at the same time addressing threats that undermine ecosystem services and environmental integrity so as to maximize the co-benefits of the forests, and serve as a pillar of action for the national climate change agenda and a leading pathway towards sustainable, low emissions development.

In terms of realizing REDD+, Ghana's strategy is to focus on the implementation of large scale, sub-national programmes that follow ecological boundaries and are defined by major commodities and drivers of deforestation and degradation, within a set of over-arching, national activities and the encompassing national REDD+ framework. This dual national-jurisdictional approach to implementation enables landscape scale actions and cross-sector collaboration, coupled with private sector participation and community-based mobilization that together will produce collective impacts, while promoting the operational and accounting efficiencies that come from using a single set of systems and processes.

The Cocoa Forest REDD+ Programme is a key pillar of the National REDD+ Strategy. It is the first programme to be developed and implemented, and it will serve to test many of Ghana's REDD+ systems, processes, and policies, including Ghana's MRV system, the FGRM, the ESMF, and reforms to tree tenure and benefit sharing. As such, the lessons and experiences from implementing and monitoring the GCFRP will directly inform the development and roll-out of the next programmes,

including an Emission Reductions Programme for the Shea Landscape of the Northern Savanna Woodland.

2.3 Political commitment

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Please describe the highest level of political commitment to the ER Programme, including the levels of support within the different levels of government and whether a cross-sectoral commitment exists to the ER Programme and to REDD+ in general.

Ghana's ER Programme has received the highest level of political commitment, in addition to receiving strong political and cross-sectoral endorsement from all levels of government. In 2014, during President John Dramani Mahama's speech to Parliament on Ghana's Coordinated Programme of Economic and Social Development Policies (2014-2020): An agenda for Transformation⁹, he stated that, "Government will also tackle deforestation as part of Ghana's REDD+ strategy to deal with climate change and also integrate water security and climate resilience into development planning processes". (H.E. John Dramani Mahama, 1st December, 2014). A year later, at the Paris CoP-21, the President indicated Ghana's ambition to pursue a low-carbon economy and sustainable development trajectory, of which of which REDD+ (and the GCFRP) are an important element in tackling climate change.

At the Paris CoP-21, the Minister of Environment, Science, Technology and Innovation also spoke in direct support of REDD+, stating that,

The ERP is one of the emission reduction initiatives to be implemented in the cocoa landscape of Ghana. With the anticipated support and investment, Ghana's ambitious ERP...is expected to yield over 255 million tons of emission reductions over the life of the programme. Aside from the mitigation benefits of implementing REDD+, the programme is also expected to increase cocoa yields per hectare, leading to a corresponding increase in profits for the farmers, export revenue for the country and a sustainable supply chain for the chocolate industry. In fact, the success and sustainability of this programme hinges largely on the associated non-carbon benefits that will make the implementation of REDD+ sustainable in the long term. (Hon. Mahama Ayariga, 10th December, 2015)

At the National REDD+ Forum, in November, 2015, the programme was also endorsed by some of Ghana's highest level politicians, including the former President J.A. Kuffour, a United Nations Special Envoy for Climate Change, the Minister for Lands and Natural Resources, the Deputy Minister for Environment, Science, Technology and Innovation, and the Chief Executive of the Forestry Commission. In his speech, former President Kuffour spoke in support of the programme, arguing that, "In the past, we viewed conversion of forests to agricultural lands as a mark of progress and development. But today, we risk losing our forests all together and therefore we much accept that deforestation and forest degradation in Ghana is unacceptable as the implications are far too serious and the risks too great."

Ghana's National REDD+ Secretariat also launched a campaign in September, 2015, to share the concept and critical need for the GCFRP with high level government officials, traditional leaders, and private sector leaders, while also highlighting the social, economic and environmental opportunities that it creates for the country.

⁹ GoG 2014. Ghana's Coordinated Programme of Economic and Social Development Policies (2014-2020): An agenda for Transformation, by H.E. John Dramani Mahama. <http://www.presidency.gov.gh/coord.pdf>

As is evidenced by Section 1.3, there is strong cross-sectoral, civil society and private sector support and commitment to the programme. Ghana’s Cocoa Board is a co-leader of the programme. Participating ministries and agencies of relevance within the NRM space include the MLNR, MESTI, EPA, and MoFA. NGO and civil society commitment comes from some of the most important and dominant cocoa buying companies, and the leading NGOs in Ghana, of both local and international origins.

From a practical standpoint, developing a results-based programme that engages multiple sectors, institutions and agencies represents a significant feat in and of itself, and is further evidence that the programme truly does have the high level political commitment and buy-in that is needed, otherwise it would not be moving forward with the cross-sector support.

As shown in Figure 1, the ER Programme is nested within the national REDD+ management architecture, demonstrating the breadth and depth of commitment to the programme. Support to the GCFRP builds off of the previously existing ENRAC, ENREG, and TCC+ bodies, which were established in 2007 to provide cabinet, ministerial, and technical level support, guidance and coordination to environmental and natural resource management projects and programmes. The programme also benefits from the direct oversight of the National REDD+ Working Group (NRWG) and the NRS.

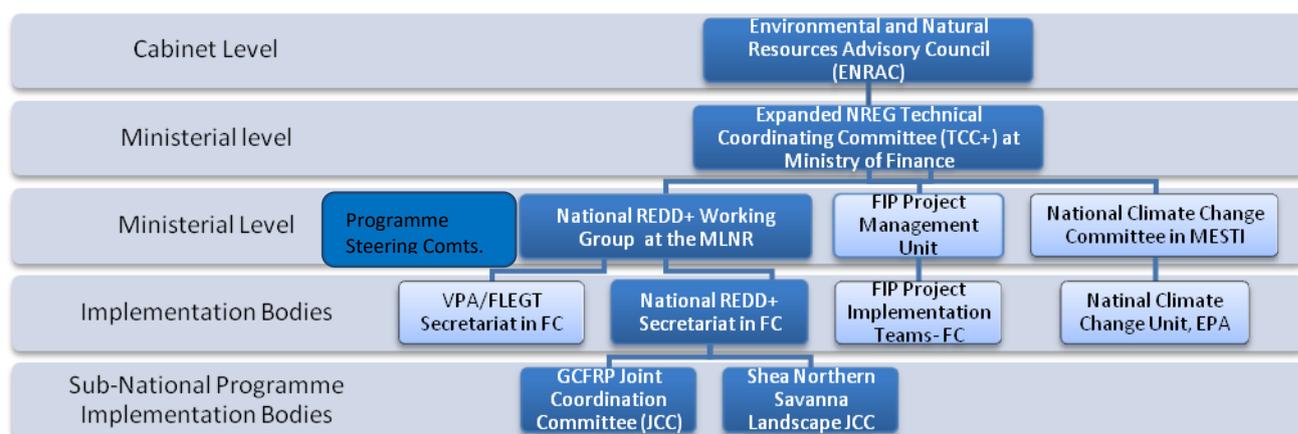


Figure 1: National REDD+ Management Architecture (REDD+ and GCFRP entities in dark blue, linked institutions in light blue)

ENRAC is a cabinet level body, chaired by the Vice President of Ghana that was established to preside upon major environmental issues that cannot be resolved at the ministerial level. Its membership includes representatives from the private sector, the National House of Chiefs, and civil society, as well as representatives from relevant ministries. ENRAC does not meet on a regular basis, but is convened in response to the emergence of major environmental challenges that require high-level attention to reach a resolution. . With respect to the GCFRP, ENRAC represents a body of last resort that can be called upon to address significant issues, when and if they arise, which other levels of programme governance cannot resolve.

The inter-sectoral **Technical Coordinating Committee-Plus (TCC+)** was established to oversee and guide the policy and institutional coordination of environmental and natural resource governance across the various government institutions. The TCC+ is chaired by the Ministry of Finance (Chief

Director) and composed of representatives of various ministries and agencies, as well as civil society representatives. The GCFRP will use FC and MLNR presence on the TCC+ to raise REDD+ and GCFRP issues as needed.

The **National REDD+ Working Group (NRWG)**, which is hosted by the MLNR, was established in 2009 to provide direct guidance to the NRS, the main entity responsible for REDD+ readiness and implementation. The NRWG is a multi-stakeholder body hosted by the MLNR that is responsible for providing advice and guidance on all aspects of REDD+. It is jointly chaired by the Deputy Minister for Lands and Natural Resources and another member elected by the NRWG. The membership of the NRWG is drawn from relevant ministries, departments and agencies (MDAs), private sector, civil society, local communities and landowners/ traditional authorities.

As implementation bodies, the **NRS** sits within the Climate Change Unit (CCU) of the FC and is responsible for overseeing all aspects of REDD+. In 2016, the FC committed to upgrading the CCU to a Directorate as a measure to ensure long term institutional support to REDD+ operations. With the move to implement REDD+ through programmatic (jurisdictional) approaches, a **Programme Steering Committee**, made up of the Chief Executives (of FC and Cocobod) and Chief Directors (of MoF and MLNR) will be convened on a biannual basis to facilitate the highest level of support and coordination within each agency. The **Joint Coordinating Committee (JCC)** is established to allow timely and effective interaction and open information sharing between agencies, and to make sure that programme implementation aligns with and is supported by the broader activities and planning processes of the Ministry, the FC and the Cocoa Board. The JCC will guide programme planning, reporting and decision-making to support implementation via the PMUs (see Sections 4.3 and 6.1). For the GCFRP, representatives of the Cocoa Board, NRS and MNLN make up the JCC.

The magnitude of political commitment to the programme is evidenced by the fact that the FC will take steps to up-grade the CCU (which hosts and functions as the NRS) to a Directorate so that it is fully resourced and equipped to support not only this programme, but also future programmes and national-scale coordination and implementation of REDD+. Currently, the CCU/NRS is not part of the FC's Executive Management Team (EMT) where strategic decisions of the FC are taken. In a post-Paris 21 regime where issues of forests and climate change have gained high prominence globally, the FC will need to address the fact that these issues are not yet considered in its strategic decision making processes and planning. The expanding scope and complexity of the responsibilities of the CCU/NRS, and the manner in which it has grown since its inception in 2008 underscore the CCU's growing importance within the FC; warranting an upgrade to a full-fledged Directorate.

Since climate change is a cross-cutting issue, it will be pertinent to promote synergy and inter-linkages between the CCU and other divisions/units of the FC at the EMT level. For example, agenda setting and planning related to ongoing emission reduction efforts, particularly for the GCFRP, will significantly benefit from the CCU's representation at the EMT, since it hosts the NRS. It will also ensure due recognition of the GCFRP in matters of prioritization of the FC's activities and allocation of resources, especially at a time when the establishment of the Programme Management Unit (PMU) for the GCFRP will place even greater demands on the CCU/NRS, necessitating its increased recognition and budgetary support.

The transition to a Directorate, which is expected to be effected by the end of 2016, will not require any additional resources since the current structure of the Unit is adequate in terms of its functionality and capacity as the NRS, and nearly all the staff are on government payroll. This will change with the establishment of the PMU for the GCFRP, but these costs are already budgeted for under the programme (See Section 6.2).

3. ER PROGRAM LOCATION

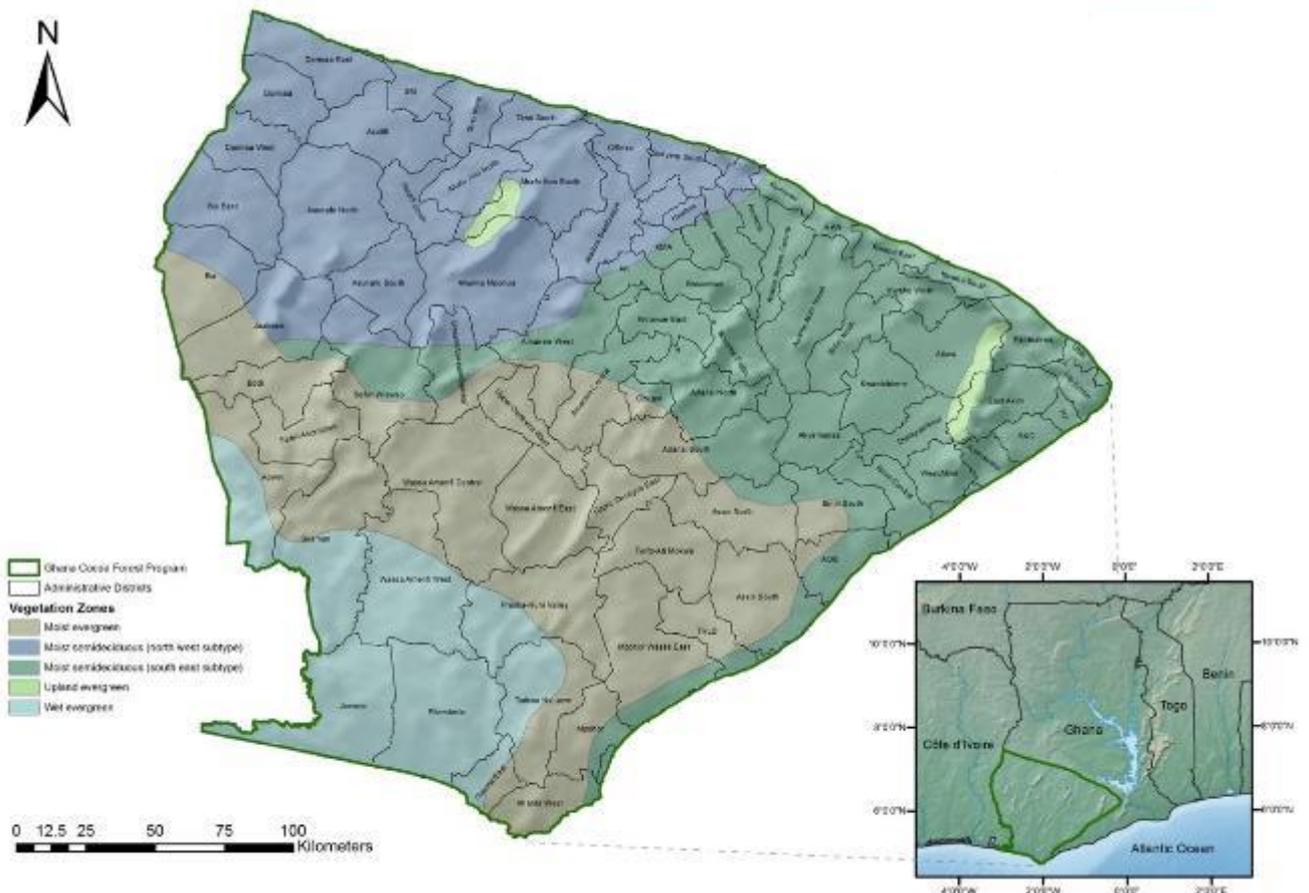
3.1 Accounting area of the ER Program

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Please present a description (including location and size, in hectares) of the proposed Accounting Area of the ER Programme, including the administrative jurisdictions or national-government-designated area(s) covered by the ER Programme and its location in the country. Also provide a map of the Accounting Area, preferably as a GIS shape file (using WGS 84)

Refer to **critterion 2** of the Methodological Framework

Ghana adopted an ecological zone (eco-zone) approach to define the area in which it plans to roll out REDD+ programmes, including the GCFRP¹⁰. These eco-zones were designated based on Ghana’s nine forest ecosystem types (Figure 2), as defined by Hall and Swaine¹¹. Five of the forest ecosystem types—wet evergreen, moist evergreen, moist semi-deciduous northwest sub-type, moist semi-deciduous south-east sub-type, and upland evergreen—were clustered together, based on their small size and common conditions, to represent a single programmatic eco-zone that is the GCFRP.



¹¹ Hall JB, Swaine MD. 1981. Distribution and ecology of vascular plants in a tropical rain forest: Forest vegetation in Ghana. Springer Netherlands.

Figure 2: Ghana's forest ecosystem types, ERP area, and administrative regions

The programme area covers 5.92 million ha, is located in the southern third of the country, and forms part of the West Africa Guinean Forest biodiversity hotspot¹². The programme area overlaps with 92 administrative districts and 5 administrative regions, including the Eastern Region, Central Region, Ashanti Region, Western Region and the Brong-Ahafo Region. However, it does not encompass the full expanse of all of these regions, as the Brong-Ahafo, Ashanti and Eastern regions stretch beyond the boundaries of the GCFRP. Approximately 2.4 million ha (Western Region and part of Brong Ahafo Region) fall within Ghana's Forest Investment Programme (FIP) area.

3.2 Environmental and social conditions in the Accounting Area of the ER Program

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Please provide a brief (maximum 2 pages) description of the present environmental and social conditions in the Accounting Area of the ER Programme including:

- Existing vegetation types, including the presence of undisturbed natural forests (short description of the major types and estimation of area as percentage of the total accounting area);
- Climatic conditions and the occurrence (frequency and estimation of areas affected as percentage of the accounting area) of catastrophic climate related events such as those related to wind (hurricanes), drought (fire) or precipitation (floods);
- Soil characteristics (short description of the major soil types, their organic matter content (if known) and estimation of area per soil type as percentage of the total accounting area);
- Presence of rare and endangered species and their habitat;
- Overview of stakeholders and rights-holders, including from the point of view of linguistic and socio-cultural diversity;
- Population demographics and growth;
- Main livelihoods and economic activities in and around the Accounting Area and the dependence of local populations on forest resources.

The programme landscape is a diverse mosaic of different forest and land-use types, including just under 1.6 million ha of closed forest and just over 1.1 million ha of open forest that fall within five main forest types,—the wet evergreen forest (387,247 ha), the moist evergreen forest (823,393 thousand ha), the moist semi-deciduous forest northwest sub-type (625,845 ha), the moist semi-deciduous forest southeast sub-type (861,284 ha), and the upland evergreen forest (37,554 ha).

Over 1.27 million ha (21%) of the programme area is gazetted as forest reserves and national parks, both of which are managed by the FC and commonly referred to as the “on-reserve”. The majority of the forests within the accounting area are located within the on-reserve. In contrast, the “off-reserve” (all land outside of protected areas) covers approximately 4.65 million ha and is made up of settlements and infrastructure, agricultural lands (including tree crops), fallow lands, and forest patches or high biomass agroforests. There are no national statistics available on the total area under cocoa farming, however it is estimated that across the HFZ, cocoa farms cover 1.8 million ha¹³.

The programme area falls within the equatorial climatic zone. It is located between latitude 07°58.5' N and longitude 02°01.3'W, with a mean altitude of 26.3 masl. The south west part of the programme area is the wettest in the country, turning increasingly drier as one moves to the north and east. The programme area experiences two rainfall periods with the major season from March to July and minor season from September to November. The annual rainfall decreases from about 2200 mm in the south-western corner to approximately 1,000 mm towards the northern part of the accounting area. There is a short dry season in August and a longer one between December and

¹² GoG, 2002. National Biodiversity Strategy for Ghana, Ministry of Environment and Science (MES), The Republic of Ghana. <https://www.cbd.int/doc/world/gh/gh-nbsap-01-en.pdf>

¹³ NCRC & Forest Trends. 2011. The Case and Pathway towards a Climate-Smart Cocoa Future for Ghana. Climate-Smart Cocoa Working Group, Accra.

March. The relative humidity is always high and is seldom below 85% and characterized by mean monthly minimum and maximum temperatures ranging from 22°C at nightfall to 34°C during the day respectively.

Climate related events like high winds, cyclones or hurricanes are quite rare in Ghana¹⁴ and do not pose a significant threat to the ER Programme. Flooding has caused significant damage and loss of life in Ghana in recent years, however these events are largely confined to urban or semi-urban areas and are as much the result of blocked and clogged waterways and the loss of wetlands to development, as they are due to high incidences of rainfall in short time periods.

Drought is an on-going event in the programme area and across Ghana's entire HFZ. Major reductions and changes in spatio-temporal rainfall patterns across the programme area are well documented over the past 45 years, with significant reductions in annual rainfall at multiple locations, including that of Kumasi, where annual rainfall declined by more than 250 mm from the period 1951-1970 to the period 1980-2000¹⁵. More recent research also argues strongly that Ghana has been in a period of prolonged, low intensity drought since the 1970s^{16,17}. This drying is driving a shift in the floristic and functional composition of the forests across the programme area, but surprisingly some argue that it is also driving an increase in biomass due to the selection of more drought tolerant species¹⁸. There is consensus amongst experts that cocoa is vulnerable to climate change, however adaptability and resilience will depend on a cocoa farm's locations within the landscape. Modeling of climatic and soil data shows that the majority of areas will be able to cope or adjust, while other areas may need to transition to new production systems or altered practices¹⁹.

During years of more punctuated drought events, the forests in the programme area have also experienced fires. Historically, Ghana's most notable fire event is the 1983 fires in which thousands of hectares of forest reserves, cocoa farms, and other lands burned across the high forest and transitional zones due to two years of severe drought and an El Nino event. However, farmers in the programme area have since been documented as possessing dynamic knowledge about how to best manage and avoid fires in their farming practices²⁰.

The soils of the HFZ are generally developed from the rock of the Birimian system which consists mainly of argillaceous sediments metamorphosed into phyllite²¹. The south western part of the programme area has highly desaturated ferrallitic soils (Forest Oxysols and Oxysol-Ochrosol intergrade) that lack available minerals and are considered to be unsuitable for cocoa production. Moderately desaturated ferrallitic soils (Forest Ochrosols) are considered to be more suitable for cocoa and are primarily found in parts of the Eastern and Ashanti regions within the programme area. Slightly desaturated ferrallitic soils (Forest Ochrosol-Rubrisol intergrade) that have a high cation exchange capacity and are generally well-drained and deep are highly suitable soils for

¹⁴ Atlantic hurricanes rarely affect West Africa because the associated easterly winds carry the storms away from the continent, and storms in this region tend to be weak. (Adapted from "List of West Africa Hurricanes", Wikipedia, January 26, 2016. https://en.wikipedia.org/wiki/List_of_West_Africa_hurricanes)

¹⁵ Owusu, K and Waylen, P.R. 2009 Trends in Spatio-Temporal Rainfall Variability in Ghana (1951- 2000) *Weather* 64:5 115-120

¹⁶ Fauset, S., Baker, T.R., Lewis, S.L., Feldpausch, T.R., Affum-Baffoe, K., Foli, G.E., Hamer, K.C., and Swaine, M.D. 2012. Drought-induced shifts in the floristic and functional composition of tropical forests in Ghana. *Ecology Letters* (2012) doi: 10.1111/j.1461-0248.2012.01834.x

¹⁷ Dai, A. 2011. Drought under global warming: a review. *Wiley Interdisciplin. Rev. Clim. Change*, 2, 45-65.

¹⁸ Footnote 18

¹⁹ Bunn C., Laderach, P., Quaye, A., Muilerman, S., Lundy, M. 2015. Bittersweet chocolate: the climate change impacts on cocoa production in Ghana. Story Map (<http://arcg.is/1Sg047s>). International Center for Tropical Agriculture (CIAT).

²⁰ Amissah, L., Kyereh, B., Agyeman, V.K. 2010. Wildfire incidence and management in the forest transition zone of Ghana: Farmers' perspectives. *Ghana Journal of Forestry*, Volume 26:61-73.

²¹ Adu, S.V. 1992. Soils of the Kumasi Region, Ashanti, Ghana. Memoir No.8. Ghana Soil Research Institute. 141 pp.

growing cocoa. Within the programme area, they are found in limited parts of the Ashanti Region, northern Western Region, and the southern Brong-Ahafo Region.

The protected forests within the ERP area contain more than 2,100 plant species, of which 23 species are endemic²², and 730 are tree species²³. Trees and woody climbers endemic to the ER Programme area include *Alsodeiopsis chippii*, *Bonamia vignei*, *Bowringia discolour*, *Cola umbractilis*, *Hymenostegia gracilipes*, *Monocyclanthus vignei*, and *Uvariopsis globiflora*²⁴. There are over 200 species of mammals in the forests of the ER Programme area, many of which are rare or endangered, including the Bongo (*Tragelaphus eurycerus*) Ogilby's Duiker (*Cephalophus ogilbys*), West African Golden Cat (*Profelis aurata*), Chimpanzee (*Pan troglodytes*), Geoffroy's pied colobus (*Colobus vellerosus*), Diana monkey (*Cercopithecus diana rolloway*), Forest Elephant (*Loxodonta Africana cyclotis*), Giant Pangolin (*Manis gigantea*), and the Pygmy Hippopotamus (*Choeropsis liberiensis*)²⁵. The programme area also supports approximately 74 species of bats, 37 species of rodents, a variety of reptiles, and over 200 bird species²⁶. The ER Programme area is identified as the landscape of endemism for at least twenty-three species of butterflies, three species of frogs (*Hyperloius baumanni*, *H. fusciventris* and *H. sylvaticus*) and one species of lizard (*Agama Sylvanus*). Bia National Park, the Atewa Range Forest Reserve, and Ankasa National Park are particularly important locations for endemism and as national "hotspots" of biodiversity.

Similar to the diverse mosaic of the ERP environment, social conditions in the ER Programme area are vibrant, culturally rich, and economically diverse. Ghana's national population, as of the 2010 National Census was just over 24.6 million people, with an average annual growth rate of 2.5%, and an increase in population density from 79 people per square km in 2000 to 103 per square km in 2010²⁷. The total population of the ER Programme area is just over 12 million people²⁸, with an almost even urban-rural divide. Kumasi, the capital of the Ashanti Region, is the largest urban centre and has a population of approximately 2 million people. The average rural population density is 103 per km², and the accounting area has a slightly higher proportion of women to men, and approximately one third to one half of the inhabitants of the districts have migrated from somewhere else in the country. National statistics suggest that over 70% of the population is literate and 75% is economically active, with the majority of people engaged both formally and informally in the agriculture and forestry sectors²⁹. Cocoa farming, other tree crop farming (oil palm, rubber, citrus), and food crop farming are the main agricultural activities in the rural areas.

The socio-cultural diversity within the GCFRP area is very high. The Akan meta-ethnic group is the largest ethnic-linguistic group in the programme area, with over two thirds of the population speaking an Akan dialect³⁰ (e.g. Twi, Ashanti, Fante, Bono) and belonging to one of many Akan sub-groups (e.g. Ashanti, Akuapem, Akyem, Akwamu, Ahanta, Bono, Fante, Nzema, Kwahu and Sefwi) that originate from across Ghana's HFZ and are its landowners. There are seven other populations represented in significant numbers in the programme area that derive from other parts of the country. They include Ewes, Ga-Dangbes, Mole-Dagbanis, Gurmas, Guans, Grusi and Mandi³¹, and

²² Hall, J.B. and Swaine, M.D. 1981. Distribution and Ecology of vascular plants in a tropical rain forest. Forest vegetation in Ghana. Geobotany 1. The Hague.

²³ Hawthorne, W.D. 1989. The Flora and vegetation of Ghana's forests In: Ghana Forestry Inventory Project Seminar proceedings, pp 8-14. Forestry Department, Accra.

²⁴ Footnote 14.

²⁵; Footnote 14; Mensah-Ntiamoah. 1989. Pre-feasibility study on wildlife potentials in the Kakum.

²⁶ IUCN 1992. The Conservation Atlas of Tropical Forests: Africa World Conservation Union, Macmillan, U.K.

²⁷ Ghana Statistical Service 2012. 2010 Population and Housing Census (PHC), Final Result.

http://www.statsghana.gov.gh/docfiles/2010phc/2010_POPULATION_AND_HOUSING_CENSUS_FINAL_RESULTS.pdf

²⁸ This figure was arrived at based upon assessment of population data from the 2010 National Census data for those districts situated within the programme area.

²⁹ Ghana Statistical Service, 2010 Population and Housing Census (<http://www.statsghana.gov.gh/censuses.html>)

³⁰ Ghana Statistical Service, 2010 Population and Housing Census (<http://www.statsghana.gov.gh/censuses.html>)

³¹ GSS 2010 Census; Ghana Web—Ethnic Groups (<http://www.ghanaweb.com/GhanaHomePage/tribes/>)

can all be further divided into sub-groups. Over the last century, the migrations in which people moved across the programme area or from other regions of the country were supported, for the most part, by open traditional systems that allowed for and even encouraged migrant settlers to help “develop” the forest land. As a result, farming and forest-fringe communities in the ER Programme area are ethnically diverse and the traditional governance structures function to support and enable these heterogeneous communities.

Across the programme’s landscape, the main stakeholders with ties to the land and its resources include the following groups:

- **Land owners:** The traditional authorities (chiefs and their representatives) and family land owners who control the majority of the land in the GCFRP area.
- **Land-users:** Predominantly smallholders with long term lease-hold or rental agreements with the landowners to cultivate the land for subsistence or economic purposes. Though traditional in their structure and conditions, most “migrant” farmers who rent or lease land maintain strong user-rights to the land and agricultural resources once they have cleared land and established farms. This is especially true when cultivation involves the planting of tree crops.
- **Forestry Commission:** As enshrined in the 1992 Constitution, the GoG has the legal mandate to manage Ghana’s natural resources on behalf of the people, including its timber and forest resources. As such, the FC has the legal right and responsibility to manage Ghana’s forest reserves and national parks, as well as timber trees in the off-reserve landscape.
- **Other Government Entities:** Many government agencies and institutions are present and working in the ER Programme landscape, including the local District Assemblies, agricultural extension services, and regulatory bodies. Though they do not own the land or its resources, they play key roles in determining land use and in supporting decision making and information sharing.
- **Women:** Though they are integral members of all of the above groups, the role of women in the social structure, and the nature of their relationships and access to resources means that they represent a unique stakeholder group that has a distinct roles in land-use decision making processes, resolution of disputes, and traditional governance systems. For example, women serve as Queen Mothers and are responsible to select the Chiefs, they are farmers and forest users who typically operate with more limited financial and labor resources, they are often the main decision makers in the household, if not the head of the household, and in addition to farming are responsible for maintaining the household.
- **Minority populations:** Minority groups also require consideration due to their migrant status and differentiated rights. For example, migrant farmers and laborers are key stakeholders because the associated rights regimes affects how decisions are made with respect to the land, trees, and forests. For migrant farmers, under the traditional governance systems, symbolic “chiefs” of other ethnic groups are often formally recognized by the land owners and by their fellow community members to lead a particular ethnic group and to liaise with the sitting rulers and decision makers. However, some minority groups who practices pastoral activities, like the Fulani, are more frequently associated with major conflicts and therefore require special attention as stakeholders if such incidences are to be reduced.
- **Private sector:** Agricultural companies and service providers represent another very important stakeholder in the landscape due to their investments and operations on the ground. Specifically, their investment and role is in the cultivation, purchase, extension, training or/or monitoring of cocoa, oil palm, and other tree crops or food crops.

4. DESCRIPTOIN OF ACTIONS AND INTERVENTIONS TO BE IMPLEMENTED UNDER THE PROPOSED PROGRAM

4.1 Analysis of drivers and underlying causes of deforestation and forest degradation, and existing activities that can lead to conservation or enhancement of forest carbon stocks

Please present an analysis of the drivers, underlying causes and agents of deforestation and forest degradation. Also describe any policies and other activities that are already in place and could contribute to conservation and enhancement of Carbon Stocks. Please provide clearly referenced sources for the analysis. Please distinguish between both the drivers and policies within the Accounting Area of the proposed ER Programme, and any drivers or policies that occur outside the Accounting Area but are affecting land use, land cover and Carbon Stocks within the proposed ER Programme Accounting Area. Draw on the analysis produced for the ER-PIN and the country's Readiness Package (R-Package), and identify any remaining gaps in information/data.

*Refer to **critterion 27, indicator 27.1** of the Methodological Framework*

The GCFRP landscape is endowed with many agricultural and natural resources that are vital to the national economy and to people's livelihoods. The main agricultural resources³² in the programme area include cocoa, palm oil, rubber, citrus, and food crops like plantain and cassava. The main natural resources found within the accounting area that contribute to the economy are gold³³ and timber. In 2015, the top foreign exchange earners for the country were gold, oil, and cocoa³⁴.

Due to Ghana's high economic dependence on natural resources, the country now has one of the highest deforestation rates in Africa, over 2.9% annually. Unlike other REDD+ countries facing frontier deforestation, Ghana's deforestation pathway is one of incremental degradation leading to deforestation and the R-PP identifies the principal drivers of deforestation and degradation, in order of relevance, as including³⁵:

- 1) Uncontrolled agricultural expansion at the expense of forests;
- 2) Over-harvesting and illegal harvesting of wood;
- 3) Population and development pressure; and
- 4) Mining and mineral exploitation.

The underlying causes of these drivers were identified as forest industry over-capacity, policy and market failures, population growth, increasing demand for agriculture and wood products, low-tech farming systems that continue to rely on 'slash and burn' farming methods, and a burgeoning mining and (illegal mining) sector. The R-PP further identifies agricultural expansion (50%) as being predominantly attributed to cocoa cultivation systems, and thus distinguishes cocoa farming as one of the most significant drivers of deforestation across the high forest zone of the country³⁶.

Following the completion of Ghana's R-PP, it became increasingly clear that the rates of forest loss and drivers and agents of deforestation and degradation varied depending upon the eco-zone. During the development of the ER-PIN, a high level group of technical experts from the forestry and cocoa sectors conducted a detailed assessment of the main drivers and agents of emissions acting within the on-reserve and off-reserve landscape of the GCFRP (Table 3).

³² Despite its importance, the contribution of Ghana's agricultural sector (including forestry) to GDP in 2014 was 21.4%, lower than in previous years but reflective of an economy that has entered middle income status and has started producing oil.

³³ The mining sector remains a strong contributor to foreign direct investment at 37% and mining contributes 1.7% of Ghana's GDP. (Ghana Chamber of Mines, 2015. Mining in Ghana – What future can we expect? International Council on Mining and Metals. Mining: Partnerships for Development July 2015). <http://www.tabforestmines.com/wp-content/uploads/2015/10/Ghana-Chamber-of-Mines-report.pdf>

³⁴ Bank of Ghana, 2015. Summary of Macroeconomic and Financial Data. <http://myjoyonline.com/docs/56588sum-data.pdf>

³⁵ GoG, 2010. Readiness Preparation Proposal Ghana: Revised Ghana R-PP. Accra, Ghana. https://forestcarbonpartnership.org/sites/forestcarbonpartnership.org/files/Documents/PDF/Jan2011/Revised_Ghana_R-PP_2_Dec-2010.pdf

And most recently, in the assessment undertaken for the development of the forest reference level for the GCFRP Area, the conversion of forests to agriculture land was identified as the primary driver of deforestation in the programme area. The assessment indicates that about 110,000 ha of forests per annum was converted to agricultural land during the reference period and this accounted for 76 percent of deforestation in the programme area. Out of the total area deforested to agricultural lands, about a third of the conversion resulted from cocoa expansion making it the single most important commodity driver of deforestation in the programme area.

Table 3: Drivers and agents of deforestation and degradation in the GCFRP

Drivers of Deforestation & Agents
Land Use Type: Protected Forest (Forest Reserve, National Park, Globally Significant Biodiversity Area)
Encroachment of low/no shade cocoa systems and associated food crops into protected forests by cocoa farmers.
Illegal logging in Forest Reserves by timber companies and chainsaw operators, legal logging by timber companies.
Illegal mining by small-scale miners (galamsey), as well as legal mining by mining companies and small-scale miners.
Land Use Type: Off-Reserve (Forests, Fallows & Trees in Landscape)
Elimination of shade trees from the cocoa system and other natural trees on-farm by cocoa farmers, chainsaw operators, and timber contractors
Logging in off-reserve concessions by logging companies.
Illegal mining by illegal small-scale miners (galamsey), as well as legal mining by mining companies and small-scale miners.
Replanting cocoa in over-aged, high shade cocoa farms by cocoa farmers as promoted by sector-wide rehabilitation and replanting efforts.
Expansion of cocoa into off-reserve forest or forest fallows by cocoa farmers.
Expansion of other tree crops and food crops into off-reserve forests or forest fallows by food crop farmers, as well as oil palm, rubber, and citrus farmers, often promoted by industry goals and packages.
Drivers of Degradation
Land Use Type: Protected Forests (e.g. Forest Reserve, National Park, Globally Significant Biodiversity Area)
Encroachment of cocoa systems into protected forests by cocoa farmers.
Legal logging by timber companies and illegal logging by timber companies and chainsaw operators.
Land Use Type: Off-Reserve (Forests, Fallows & Trees in Landscape)
Reduction in shade trees on cocoa farms and in the farming system.

The underlying causes of these drivers broadly stems from sector policies (e.g. tree tenure policies) and traditional norms (“abunu” sharecropping does not favor rehabilitation of old cocoa farms) that create perverse incentives and promote expansion, the prioritization of economic growth with only limited regard for environmental sustainability (e.g. agriculture and mining sectors), increased market prices and demand (cocoa, oil palm, rubber, gold, domestic timber), lack of coordination and collaboration within and between sectors, ineffective law enforcement, and a total lack of land-use planning in rural areas.

This has therefore resulted in the continued conversion of lands and expansion of cocoa and other crops and tree crops at the expense of forest, trees, and ecosystem services. For example, Ghana is the world’s second largest producer of cocoa beans, but average farm yields remain low, estimated at 400 kg/ha. The vast majority of all of Ghanaian cocoa is grown within the GCFRP area by about

800,000 smallholder farm families. National cocoa production has increased from approximately 399,691 tons in the 2001/2002 season to 740,000 tonnes in 2014/2015, with a national production peak in 2011/2012 of 1 million tonnes. Though yield gains have been achieved across this period as a result of the sector programs aimed at increasing input supply (High Tech), disease and pest control (CODAPEC), and replanting and rehabilitation (CORIP), national production gains have also resulted from area expansion, which aligns with Ghana's increasing deforestation trends in the landscape. Thus, people's dependence on this sector for their livelihood is very high³⁷.

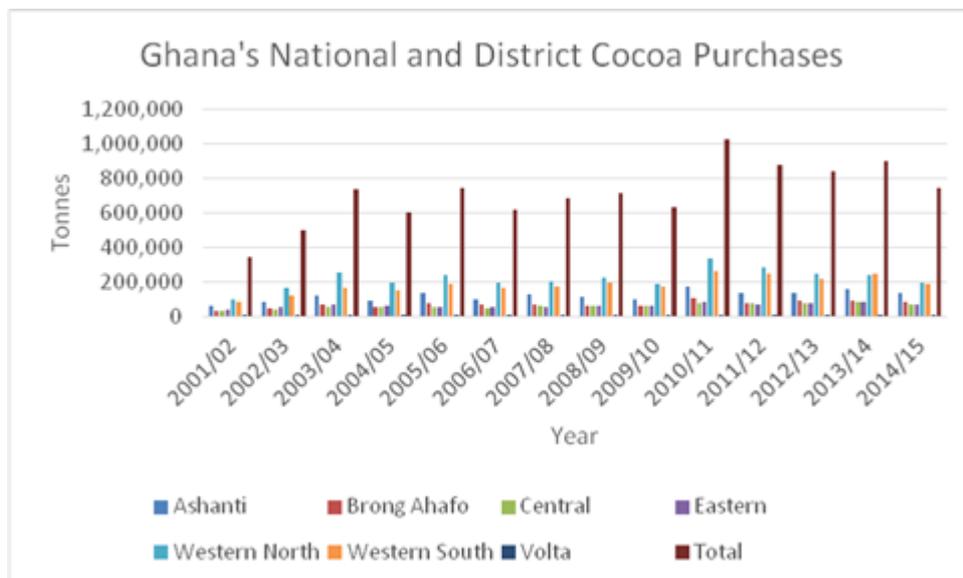


Figure 3: National and regional cocoa purchases from 2001/02 to 2014/15

The problem of illegal small-scale mining (galamsey) is one example of how the influence and impact of drivers can change in a short period of time. Though illegal mining has always occurred in Ghana and was mentioned in the R-PP, its escalation post-2012 has brought it to the forefront as one of the major drivers of deforestation in the GCFRP area. As such, Ghana's National REDD+ Strategy lists illegal small-scale mining as a serious driver and the scale of its impact has been documented through remote sensing analysis during the design of the GCFRP³⁸. The increase in emissions from illegal mining has come as a result of a global jump in the price of gold, government support of legal small-scale mining, the implementation of large scale infrastructure projects that brought foreign laborers (e.g. the Bui Dam, funded by the AfDB with Chinese contractors), and the increasing availability of machines and foreign expertise.

Timber stocks in Ghana are on the decline as a result of the dwindling forest resource base³⁹, but despite the decline in export revenue from the forestry sector, the domestic demand for timber has been increasing over time, and with it illegal logging. For example, Hansen et al. (2012) documented how Ghana has exceeded its annual allowable cut by six times in the domestic market alone⁴⁰.

Oil palm, rubber and other tree crops like citrus are also important commodities produced within the accounting area. Though these commodities have yet to cause significant emissions, both rubber and oil palm are in a period of expansion and could pose a future threat to off-reserve forests

³⁷ World Bank. 2013. Ghana: Cocoa Supply Chain Risk Assessment. Washington, D.C. <https://openknowledge.worldbank.org/handle/10986/16516>

³⁸ NCRC 2016. Ghana Cocoa Forest REDD+ Programme – Draft Implementation Plan Report. http://www.fcghana.org/userfiles/files/redd/GCFRP_draft_Implementation_Plan_2016.pdf

³⁹ Oduro, K.A., Mohren, G.M.J., Affum-Baffoe K., and Kyereh, B. 2014. Trends in timber production systems in the high forest zone of Ghana, *International Forestry Review* 16(3):289-300

⁴⁰ Hansen, C.P., Damnyag, L., Obiri, B.D., and Carlsen, K. 2012. Revisiting illegal logging and the size of the domestic timber market: the case of Ghana. *International Forestry Review*, (14(1), 39-49.

and high biomass fallows and secondary forests. For example, oil palm cultivation covers over 400,000 ha in the GCFRP area, and production is currently in an expansion phase as the sector tries to meet a national palm oil deficit of 35,000 tons and a regional deficit of 850,000 tons. It is estimated that independent smallholders are producing over 1.2 million metric tons of fresh fruit bunches (FFB) per year and estates processing over 400,000 metric tons⁴¹.

Because Ghana defined the boundaries of the GCFRP based upon ecological boundaries, there are few significant drivers or policies focused outside of the accounting area that could increase emissions within the accounting area. The farming systems and natural resources located outside of the programme's boundaries tend to be ecologically and climatically limited, and the related policies are also limited in their geographic scope.

Ghana does have policies and activities in place that could contribute to the conservation or enhancement of carbon stocks in the programme area.

- *Ghana's Land Administration Project (LAP)* commenced in 2003 and seeks to implement the policy actions recommended in the National Land Policy of 1999 over a 15-25 year period with an aim of addressing the challenges associated with the land sector in Ghana. Land use planning features strongly in Ghana's LAP and is being spearheaded by the Town and Country Planning Department. However, work thus far has focused on spatial planning for human settlements and urban development with very limited attention to rural areas and other land uses – agriculture, forestry, mining etc. Therefore, there is still a strong need for the GCFRP to pioneer landscape level land-use planning and the accompanying institutional and public-private sector coordination across the cocoa-forest landscape.
- *Ghana's FIP* will implement projects in the Western and Brong-Ahafo regions that support the establishment of biodiversity corridors, tree planting for appropriate shade management in cocoa farms, as well as plantation development.
- *Ghana's Forest Plantation Strategy (2016-2040)* aims to promote the restoration of degraded forest lands through the development of commercial forest plantations, smallholder plantation, enrichment planting, and incorporation of trees on farm.
- *The FLEGT-VPA* process, in which Ghana has committed to developing a timber legality assurance system so it can verify legal timber products, for both international and domestic markets, has progressed to the 'joint assessment of the legality assurance system'. Once it is demonstrated that the system is fully operational, as described in the VPA, then a recommendation can be made for Ghana to start issuing FLEGT licenses for export to EU countries.
- *The Ghana Cocoa Sector Development Strategy II* is currently awaiting validation. It is expected that this strategy document will provide overarching guidance towards enhancing sustainability of cocoa production in Ghana through the development of a Ghana Standard that leads to yield improvement, an increase in shade cover in cocoa farming systems to recommended levels and the prevention of the expansion of cocoa into forested areas.

4.2 Assessment of major barriers to REDD+

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Please describe the major barriers that are preventing the drivers from being addressed, and/or preventing conservation and Carbon Stock enhancement from occurring. Draw on the analysis produced for the ER-PIN and the country's Readiness Package (R-Package).

⁴¹ Ministry of Food and Agriculture 2011. Master plan Study on the Oil Palm Industry in Ghana. Final Report. MASDAR, November 2011. <https://drive.google.com/a/st.ug.edu.gh/file/d/0B4fn1Fz6J8K9djY5X1JlaHVyeUE/view>

The decision to pursue a jurisdictional, programmatic strategy to mitigate the main drivers of deforestation and degradation was largely influenced by the recognition that the barriers can only be addressed at a landscape scale, because they are landscape issues. These barriers include the lack of coordination and planning amongst implementing agencies, companies, organizations and governance bodies across the cocoa and forestry sectors, which has allowed institutions to work in contrast to one another. In addition, farmers’ and forest users’ decision-making is still being driven by economic and policy constraints, including limited access to resources (information, economic, agronomic), tree tenure regimes that do not incentivize retention of trees on-farm, and land-use arrangements that promote extensive practices. The lack of resources and capacity to support effective law enforcement have also left the forests highly exploitable. And the total absence of land use planning in rural areas has meant that there is no reflection or planning about how resources should be managed.

Mining is increasingly becoming a key driver of deforestation in the programme area. The incidence of legal/illegal surface mining with deleterious impact on forest cover has shot up significantly over the past few years driven primarily by a myriad of factors which have been outlined below. Although, curbing illegal mining activities is primarily a national security concern, the GCFRP implementation will partly focus on piloting approaches towards addressing barriers that have worsened illegal mining activities within the selected HIAs. In addition, the programme will also keenly follow and collaborate with other measures targeted at addressing the barriers and threats associated with illegal mining activities and being spearheaded by relevant state institutions including the MC and agencies responsible for national security. All of these barriers are further described in Table 4.

The logic and strength of the GCFRP is that it is built upon the concept that these drivers and barriers cannot be addressed at a project or singular institutional level, which has been the practice to date, but necessitate a large-scale, integrated approach in order to foster the large-scale changes in farming practices and land use decision making required to reduce deforestation and degradation, and to foster the growth of forests and trees in the off-reserve farming landscape. Therefore, the development of the GCFRP is an effort to use a coordinated landscape approach that targets all stakeholders as a strategy to change the business-as-usual and reduce emissions from the landscape.

Table 4: Major barriers to achieving REDD+ and CSE and progress in overcoming these barriers

Drivers	Existing Barriers to REDD+ and CSE	Progress in Overcoming Barriers
Cocoa farm (and food crop farm) encroachment and expansion.	Lack of sector coordination: Institutional culture has discourage collaboration or coordination on the ground. The culture of government institutions, scope of responsibility, limited resources, and desire to retain control over the institutional “territory” has in many ways prevented government bodies, like the Cocoa Board and the FC, from working together. The inward focus of project by the private sector, civil society, and government initiatives has meant that there has been very limited coordination of resources across the landscape. The private sector and civil society are investing substantial resources into cocoa projects and programs.	Collaboration in target landscapes and across institutions: The main barrier, which this program will address, is the inward oriented, short term project-driven mentality of these initiatives, and competition between private sector players, which has prevented initiatives from thinking and working at a landscape, sector-wide scale. A strong and inclusive REDD+ readiness process and the drafting of the ER-PIN and design of the ERPD have already led to increased coordination between sectors. The FIP is also contributing to this shift. There is a new, positive outlook carrying forward, however, more progress is required. Key private sector companies, like Touton, Olam, Mondelez, and Armajaro are also showing a desire to collaborate in target landscapes.
	Ineffective law enforcement: Within the FC there is limited capacity and resources to monitor and enforce boundaries, and to pursue	Improving law enforcement will come from combining hard and soft approaches in tandem. Expanding law enforcement capacity is a priority

	<p>cases within the courts. Communities and Traditional Authorities have few incentives to protect forests due to the absence of benefits and accountability to do so.</p>	<p>of the programme and resources have been allocated to do support its enhancement—over \$4 million for the first 5 years. The soft approach, which is even more important, will come through the leadership of traditional leaders and the development of HIA management plans that will reduce encroachment by giving communities the power and responsibility to create rules, resulting in the adoption of district by-laws, that will be monitored locally.</p>
	<p>Ineffective cocoa sector certification and policies: Within the cocoa sector, there is not a common definition of sustainability and landscape issues and emissions have never truly been addressed. Consequently, deforestation has continued relatively unabated, despite the implementation of numerous “sustainability” projects and certification initiatives. Extension systems, which operate under public-private partnerships, have very high implementation costs and therefore the majority of farmers do not receive access to any form of extension. Even farmers who want to follow best practices lack easy access to financial resources. Further, poor implementation of government’s input-supply policy has resulted in a recent fall in yields. Farmers who do practice recommended practices and invest in inputs on-farm are also at high risk from losses due to climate change.</p>	<p>Steps that are being taken to develop a Ghana Climate-Smart Cocoa Sustainability Standard will ensure that deforestation and landscape emissions are taken into account, and the HIA model will reduce implementation costs. The commitment, leadership and investment from the private sector and Cocoa Board will lead to major improvements in the system. Through the CSC Standard resilience to climate change will be improved.</p>
	<p>Low cocoa yields: It is cheaper for farmers to expand/encroach in order to exploit the forest rent than to invest in inputs and other best practices. Farmers have limited access to key farming inputs and extension on best practices that could otherwise increase yields, as described above.</p>	<p>Models and systems to improve yields have been demonstrated by the private sector, but the GCFRP will enable them to be scaled out to many more farmers. FIP activities in target HIAs will provide an early start to the roll-out climate-smart cocoa practices.</p>
	<p>Lack of land-use planning in rural areas: In the absence of landscape level land-use planning, cocoa farmers and land owners can expand or encroach into forest areas with few consequences.</p>	<p>Implementation of the HIAs will lead to the development of landscape management plans. The FIP is expected to help address this barrier with its focus on CREMA establishment and land use planning in target HIA landscapes. Ghana’s Land Administration Project (LAP) has the potential to help address these barriers as well.</p>
Illegal logging	<p>Ineffective law enforcement: There has been limited financial resources and capacity of FC to effectively monitor, enforce or prosecute the laws. Community members and leaders are not authorized nor incentivized to support law enforcement.</p>	<p>See improving law enforcement above. FLEGT-VPA: Ghana has made significant progress on its FLEGT-VPA, even leading an initiative to include domestic timber, but it has yet to receive authorization for a full roll out. This is expected to happen in the near future.</p>
	<p>Market demand: The domestic demand for timber is very high and cannot be met by the annual allowable cut. Thus contractors often exceed their permits or yields without consequences and chainsaw operators are incentivized to cut trees within forest reserves or farms to meet the market demand.</p>	<p>Ghana Forest Plantation Strategy: The GFPS is going through final validation. With the private sector and Ghana budgetary support that is expected to follow, the strategy will help to reduce demand from illegal sources by providing a major new source of domestic timber, while also supporting carbon stock enhancement in the</p>

		GCFRP area, which will meet domestic timber and climate goals.
	Perverse or ineffective formal and customary policies: Farmers and community members ignore or enable illegal logging because they do not have economic rights to trees.	Tree tenure reform is underway and recommended reform options will be tested within HIAs.
Legal and illegal small-scale mining	Market demand: Due to the global price of gold, the promise of high economic return from mining drives these practices.	The international gold price peaked at a ten year high in 2012, but has been declining ever since. In addition, many of the surface mining opportunities in the GCFRP landscape have been exhausted. The programme expects that the surge in illegal small-scale mining will therefore decline significantly.
	Ineffective law enforcement and institutional weaknesses: Illegal small-scale mining is a national security threat due to the level of conflict that can and has ensued, and thus is not a barrier that the program can hope to address without national security bodies taking the leading and enforcing the full implementation of the law.	Nonetheless, GCFRP collaboration with the MC has begun and it is expected that land use planning in HIAs will help to address this challenge.
	Low cocoa yield: Low economic returns from cocoa farming and other practices due to depleted soils and lack of access to economic and agronomic resources often drive farmers to allow conversion of cocoa farms to small-scale gold mines.	The programme is designed to address the problem of low yields and to ensure financially sustainable HIA landscapes.
	Lack of land-use planning in rural areas: In the absence of landscape level land-use planning, individuals can convert their lands to mining when and as they wish. This remains a major barrier to addressing the mining issue.	Collaboration in target landscapes and across institutions: See response in Cocoa farm encroachment and expansion section above.
	A myopic focus on maximizing mining revenues by actors, including the government, without due consideration of the negative and in some situations irreversible environmental impacts,	The GCFRP can shed much needed light on this issue at multiple levels and will champion sustainable options in HIAs.
	Challenges with the governance framework on mining including an under-resourced Commission, inadequate compensation and transparency concerns that drive key stakeholders, including unemployed youth, to undertake illegal mining activities. The lack of land use planning and absence of interventions to support best practices also contributes.	See response above as to how programme will indirectly tackle this barrier. The Cocoa Board has launched a new initiative to target youth in cocoa farming , which give them new options
	Perverse or ineffective formal and customary policies: Farmers have no economic/management rights to economic trees, and receive no benefits when they are legally harvested by others. Contracts granted in cocoa farms causes damage to cocoa trees, with little to no compensation for farmers, and illegal chain-sawing of trees in farms further exacerbates the problem. It is widely recognized that Ghana's tree tenure regime	See Tree Tenure Reform in Illegal Logging above. FIP is designed to address some of these issues, both by encouraging good shade management in cocoa farms (climate-smart cocoa) with access to shade tree seedlings, as well as piloting of tree tenure reforms.
Elimination of shade trees in cocoa farms and other lands		

	creates a perverse incentive to remove trees from the farming system.	
	Low cocoa yield: There has been a lack of information about the ecological benefits of shade trees in cocoa farms and many farmers have a negative perception of some shade tree species. As a result, many farmers eliminate shade trees in an effort to increase yields.	Directly addressed by the programme.
Replanting over-aged high shade/ high biomass cocoa farms	Perverse or ineffective formal and customary policies: The cocoa sector policy to replant/rehabilitate old cocoa farms has failed to conserve high biomass in many of these farms. Currently the policy promotes farmers to reduce or eliminate mature shade tree canopies, resulting in significant loss of biomass, through the recommended replanting practices.	CSC Good Practices guidelines to be promoted under the Standard, coupled with land use planning in HIAs will address this.
	Lack of land-use planning in rural areas: The absence of landscape level land-use planning has meant that land owners and land users often convert such lands to lower biomass uses.	HIA landscape land use planning will address this.
	Low cocoa yield: Low cocoa yield pushes farmers to rehabilitate old farms and in doing so remove the shade tree canopy.	See responses given above.

4.3 Description and justification of the planned actions and interventions under the ER Program that lead to emission reductions and/or removals

Please describe the proposed ER Programme Measures (new or enhanced actions, measures, policy interventions or projects), including those related to governance, and justify how these ER programme Measures will address the drivers and underlying causes of deforestation and forest degradation and/or support Carbon Stock enhancement, to help overcome the barriers identified above (i.e., how will the ER Programme contribute to reversing current unsustainable resource use and/or policy patterns?). Please explain the prioritization and timelines of the planned ER Programme Measures based on the implementation risks of the activities and their potential benefits.

Refer to **critterion 27, indicator 27.2** of the Methodological Framework

Building from the main interventions laid out in the ER-PIN, focused brainstorming by technical experts, and input based on the experiences and ideas of key stakeholders and partners, Ghana has constructed a set of priority interventions and activities that are arranged according to 5 key pillars. **These activities and concepts are not new ideas, but represent well tested and adopted models, activities, and practices.** The programme’s implementation plan therefore builds upon what has been shown to work and brings them together to operate in concert across the landscape. It is expected that these actions and interventions will lead to emission reductions and removals in the GCFRP landscape.

This section provides an overview of the main interventions and activities that will be implemented to set the programme in motion and enable it to achieve its goals. These interventions and activities are organized according to the programme’s 5 main pillars: A) Institutional Coordination and MRV; B) Landscape Planning within HIAs; C) Increasing Yields via Climate-Smart Cocoa; D) Risk Management and Finance; and E) Legislative and Policy Reforms (Figure 4). These pillars are based on the original pillars described in Ghana’s ER-PIN but reflect a new degree of thought and experienced reflection on what it will take to make the GCFRP implementable and successful.

These interventions are further elaborated through a narrative description that provides the specific details about who is responsible for the interventions, the associated sub-activities, and the logic that underpins them.

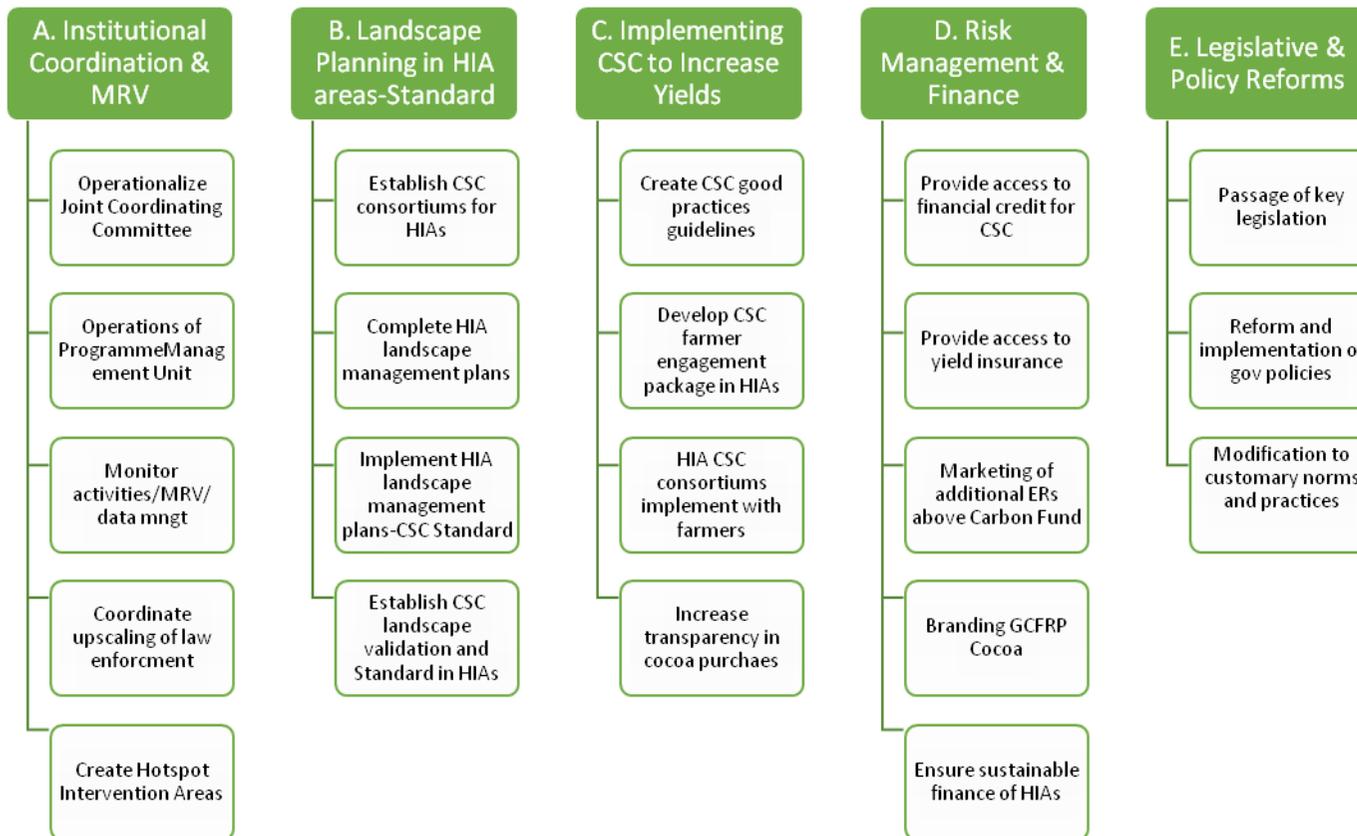


Figure 4: Implementation plan and intervention and activities

A. Institutional Coordination & MRV

Ghana views institutional roles and arrangements as a key part of the implementation plan, however three of the five main elements of this part of the plan, including; A1) Operationalizing the Joint Coordinating Committee, A2) Establish and Support Operations of the PMU, and A3) GCFRP Activity Monitoring/MRV/Data Management are described in Section 6.1—Institutional and Implementation Arrangements.

A1. Operationalizing Joint Coordinating Committee (JCC)

See Section 6.1

A2. Establish and support operations of Programme Management Unit (PMU)

See Section 6.1

A3. GCFRP activity monitoring/MRV/Data management system

See Section 6.1

A4. Law enforcement of GCFRP area

To successfully achieve emission reductions within the GCFRP area, enhanced attention and significant financial support will be given to the FC (FSD and WD district offices) to reduce illegal activities associated with mining (galamsey), chainsaw operations, and to a lesser extent bushfires. This will come through new collaborations with communities and other government agencies (MC), improved monitoring techniques and expanded operations, and a significant scaling up of human and financial resources to support the full implementation of forestry and natural resource laws through arrests and prosecution of perpetrators.

Within the HIAs, monitoring of deforestation and degradation activities and trends will happen through an approach that combines remote sensing with on-the-ground observations using existing structures and facilities within the RMSC. In line with HIA consortium agreements, partnerships will be established between FSD and Wildlife staff, the HIA governance board (see A5, below) and other consortium members to enable frequent patrols and monitoring. These collaborations and agreements will be developed such that community members can play a key role (under the authority of the FC) in monitoring and reporting illegal activities to the authorities.

If the prevalence of illegal activities is high, resources will be mobilized from within the programme law enforcement budget to FC district/regional offices to support swift reactions and enforcement of the laws. This could be in the form of increasing the number/strength of FC Rapid Response Unit teams, increasing the number of lawyers to prosecute violations of the law (both in district courts and in Accra), or increasing support to fire volunteer teams. The RRU was established to combat illegal forest operations within the forest estate, and provide timely response in halting (disrupt and suppress) organized forest and wildlife crime to eventually reduce forest and wildlife offences. However “soft” approaches to sustaining resources such as increasing benefits through tree tenure reforms and higher level community involvement in resource management would be also be adopted since “hard” law enforcement techniques are fraught with some limitations, and can only be successful if coupled with community engagement and co-monitoring⁴².

At the community level, sensitizations on laws and illegal vs. legal activities will also take place. Most importantly, however, the traditional authorities will be asked to take a strong role in enforcing traditional norms and practices and deterring illegal activities. When fully engaged on an

⁴² A recent study by Franck and Hansen (2014) assesses the effectiveness of Ghana’s FC task forces in reducing illegal logging and makes recommendations which align with the programme’s law enforcement implementation plans.

issue, the power of traditional leaders and land owners to influence outcomes is very strong. Through the traditional systems, each HIA constitutions will incorporate land use plans that eliminate the opportunity for illegal land use practices and result in the establishment of local rules that outlaw activities related to illegal logging, mining and/or bush fires. These rules will be backed by district level by-laws, which enable arrests and prosecutions to take place locally. Through existing CREMAs, Ghana has already demonstrated many successful community-based law enforcement outcomes from this model. It is not a new concept, but a tested practice.

In areas that fall outside of the first set of HIAs, increases in deforestation and degradation will be monitored from annual remote sensing analysis or identified by regional and district level FSD and WD offices. Where deforestation and degradation events emerge, the GCFRP will make resources available to the FC and other partners to be able to respond to the threats in a timely and effective manner.

The Forestry Commission has a long-standing tradition of managing forest reserves guided by management plans that sets out clear management objectives and the basis for actions and measures necessary for achieving them. This approach has remained the practice up to now and the FC makes continuous efforts to revise these management plans over time (the latest being the 2014 revised management plans) to accommodate changing situations and exploit available opportunities e.g. VPA-FLEGT, REDD+, Forest Certification.

There are also a number of toolkits and codes that provide guidance for forest managers and administrators to facilitate and promote sound forest management practice in Ghana, including the Forest Protection Strategy, FC Logging Manual and the set of Manual of Procedures (MoP). There are also Biodiversity Management Plans for selected reserves designated as Globally Significant Biodiversity Areas due to their high levels of biological diversity determined through scientific field assessments. The FC has also instituted penalties and other measures of deterrence including the withdrawal of "Property Mark" (authorization for timber firms to operate legally) as well as fines for breach of forest regulations.

Outside the gazetted forest reserves where FC control limited, timber salvage operations are regulated using existing forest laws and codes (e.g. MoPs). Efforts to introduce a Legislative Instrument (LI)—Timber Resources Management and Legality Licensing Regulation 2016—to strengthen regulation of timber operations off-reserve are far advanced.

A5. Creation of CSC Hotspot Intervention Areas

The programme has identified 9 possible Hotspot Intervention Areas (HIAs) (Figure 5), of which approximately 6 are in the process of being selected through consultations to serve as priority areas for immediate concentrated interventions at the farm to landscape level. These areas have been delineated as groups of districts and selected based on the assessment and comparison of key parameters such as: (i) deforestation trends and drivers of deforestation, (ii) cocoa production, (iii) and population.

In order to ensure a manageable intervention landscape sizes, it was decided that in the initial implementation phase (first 5 years (2017-2021)), the HIAs should cover about 200,000 ha each and all together account for approximately 30%-40% or 2 million – 2.5 million ha (maximum) of the total GCFRP area. Estimates based on three groupings of HIAs suggest that the GCFRP could achieve just over 5 million tonnes emission reductions (CO₂e) in the first five years of the programme.

Table 5 provides a general breakdown of the nine proposed HIAs, including districts, regions, area, and total HIA area. The programme has already identified 3 HIAs where efforts are slated to being,

or have already begun and the remaining HIAs and their consortiums will be identified in the coming months.

- The “Suaman Sefwi-Akontonbra Aowin” HIA Consortium (#8) will be led by the FIP team,
- The “Juabeso-Bia” HIA Consortium (#9) will be led by Touton/PBC with SNV, Agro-Eco and other stakeholders.
- The “Adansi South Adansi North” HIA Consortium (#6) will also be led by Touton/PBC.

The implementation of priority activities in each HIA will rely on a consortium of stakeholders (HIA CSC Consortium⁴³) who live, work, or have investments within the landscape, and have an interest in the area. The landscape itself will be managed by an HIA Governance Body made up of local land-users, land owners and traditional authorities who organize themselves into a government recognized NRM structure, like that of the CREMA, which accords them the right to manage their natural resources for their benefit.

Table 5: Possible Hotspot Intervention Areas (HIAs) for the GCFRP

HIA & Districts	Region	Capital	Total Area (ha) / Area
#1			365,673
Ahafo Ano South	Ashanti	Mankranso	120,098
Atwima Mponua	Ashanti	Nyinahin	168,433
Atwima Nwabiagya	Ashanti	Nkawie	77,142
#2			245,976
Kwaebibirem	Eastern	Kade	72,975
Asante Akim South	Ashanti	Juaso	115,524
Birim North	Eastern	New Abirim	57,477
#3			209,495
Bibiani/Anwiaso/ Bekwai	Western	Bibiani	82,067
Sefwi Wiawso	Western	Sefwi Wiawso	127,428
#4			216,965
Atiwa	Eastern	Kwabon Town	99,116
Denkyembour	Eastern	Akwatia	48,251
East Akim	Eastern	Kibi	69,597
#5			212,862
Assin South	Central	Nsuaem Kyekyewere	113,777
Assin North	Central	Assin Fosu	99,086
#6			212,767
Adansi South	Ashanti	New	129,694

⁴³ Though CSC primarily refers to climate-smart cocoa, it encompasses the broader concept of transitioning land use practices and production system across the HFZ to a climate smart, low emissions landscape that supports sustainable production system. Therefore, where other tree crops (like oil palm or rubber) or land use practices (like illegal mining) are contributing to deforestation and degradation (or other types of emissions), the same concepts, structures, and steps will apply.

Edubiase			
Adansi North	Ashanti	Fomena	83,073
#7			328,512
Asutifi	Brong Ahafo	Kenyasi No. 1	93,665
Asunafo South	Brong Ahafo	Kukom	78,175
Asunafo North	Brong Ahafo	Goaso	156,672
#8			376,993
Suaman	Western	Enchi	177,077
Sefwi-Akontobra	Western	Akontombr a	71,663
Aowin	Western	Dadieso	128,253
#9			243,561
Juabeso	Western	Juabeso	134,086
Bia	Western	Old Debiso	109,474

*HIA colors align with the boundaries shown on Figure 5, below.

The Consortium and the HIA Governance Body will establish how best to coordinate all activities related to the programme in their HIA's. The PMU and the HIA Consortium will carry on a participatory process to build the HIA governance and implementation structure at each location. This process can take time but will happen in concert with the implementation of key activities to reduce deforestation and degradation, and will not delay implementation or require a new readiness process, per se. Depending on the status of any existing work on-going in the area, the programme will support community entry processes and key stakeholders engagement meetings with traditional authorities, district assemblies, LBCs, and farmers. Following successful negotiation of HIA initiation, the programme will support the requisite steps to establish management boards, prepare HIA constitution, and hold regular HIA governance meetings.

Key decisions of the HIA Governance Board will be to determine how best to make the transition to a climate-smart, no deforestation cocoa production programme. Key activities will involve landscape planning, zoning land use practices, approving CSC practices to be adopted by farmers in the HIA, financial planning and management structures, and reaching agreements with the HIA CSC Consortium. Appropriate levels of communications with all stakeholders will be achieved through durbars, local FM radio announcements and other media.

LOCALIZATION OF GHANA'S HIAs (ADMINISTRATIVE DISTRICTS)

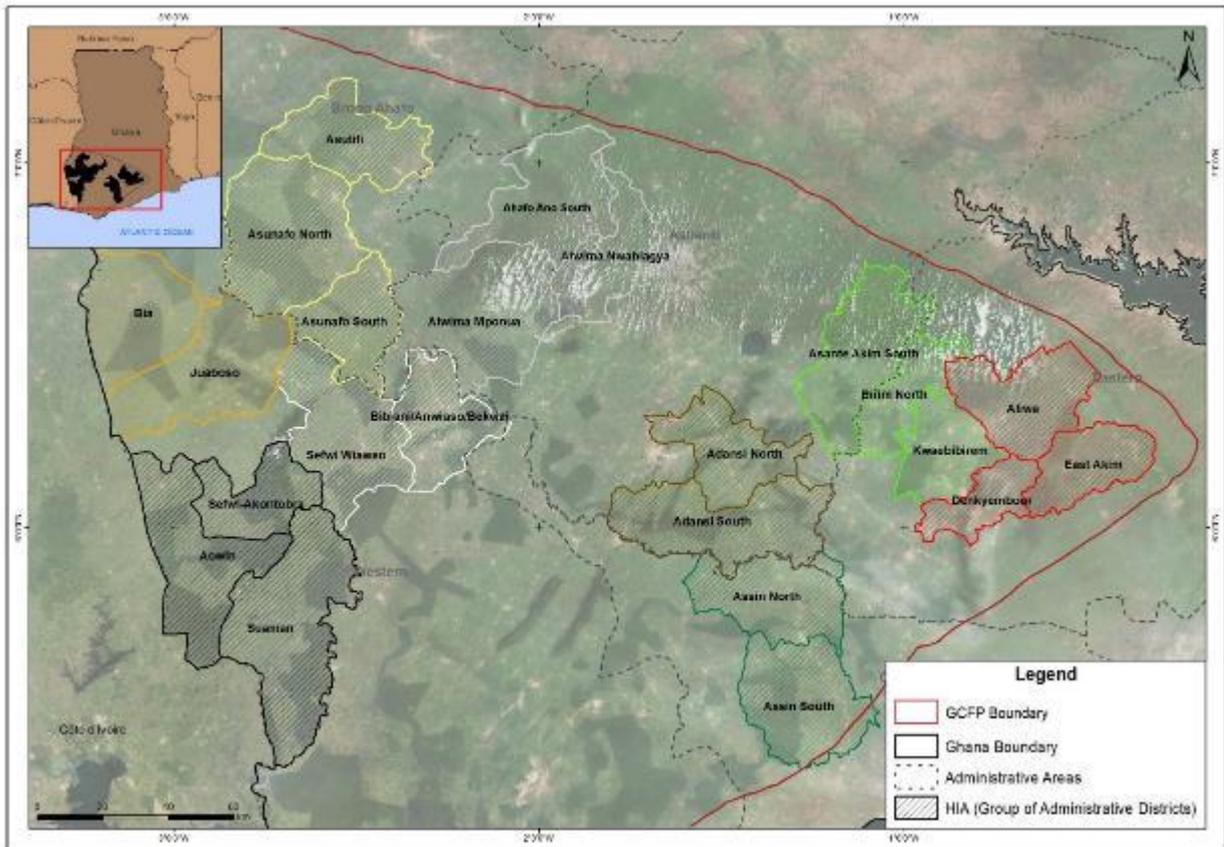


Figure 5: Nine proposed HIAs for the GCFRP⁴⁴

B. Landscape Planning within HIA areas

B1. Establish CSC consortium for each HIA

Landscape planning within HIAs will happen through the HIA Consortiums of key stakeholders and in collaboration with the HIA Governance Board. The essence of a consortium is to ensure that all of the major stakeholders, actors, and entities existing or operating in the landscape are working together towards a common goal of reducing deforestation and degradation, and not operating in isolation, or worse, in contradiction to this goal. Only through the establishment of a consortium can the GCFRP hope to achieve landscape-scale impacts on the ground.

The first step, which in line with A5, above, is therefore to identify the key stakeholders (traditional authorities, LBCs, CSO, farmers associations, government agencies) in each HIA so as to facilitate their engagement with the GCFRP in the HIA. Work has been completed to identify some of the major NGO and private sector programme partners that are active and operating in the programme area and administrative districts. However, The NRS and PMU will need to ensure that all key HIA stakeholders have been identified and then move to conclude formal agreements that establish clear roles and responsibilities of the consortium partners. This will require initial meetings with each stakeholder, followed by broader meetings and discussions before moving to specific negotiations and the conclusion of written agreements.

⁴⁴ GCFRP Implementation Plan

B2. Complete HIA Landscape Management Plans

In order to ensure full buy-in and agreement on landscape management, each HIA will need to complete an HIA Management Plan (HIA-MP). A recommended process has been developed, but adaptations will likely be needed. The programme will support all aspects of this process including mapping farms, forest reserves and other land uses within the HIA. This is reflected in the GCFRP budget. Analysis will be undertaken of the land uses and areas of deforestation/degradation and possible enhancement areas. Negotiation processes with all stakeholders will be supported to determine the CSC options and strategies appropriate to the HIA that will result in reduced emissions. The outcome from this process will be the preparation of a landscape management plan for each HIA. Following the drafting of this plan, the programme will support a public review/validation process at the HIA level. The outcome from this process will be the delivery of a consensus plan with strong traditional leadership support and endorsement by the Forestry Commission and the Cocoa Board.

There is widespread agreement in Ghana that developing and implementing landscape management plans will be one of the main activities that will lead to reducing deforestation. Outside of urban areas, there is virtually no landscape level land-use planning. Initiating this process through HIA governance boards and consortiums is expected to help address the cocoa expansion, as well as expansion of illegal mining.

B3. Implement HIA Management Plans

Implementation of the landscape management plan will involve broad awareness creation and trainings on CSC with community leaders and opinion leaders, conducting regular patrols of the HIA through community-based efforts with FC/WD officials (as necessary), undertaking land-use enhancement activities together with HIA leaders, implementing CSC practices (Pillar C), and negotiating grandfathering arrangements for irregular land uses.

B4. Establish CSC landscape level validation and CSC Sustainability Standard in HIAs

An important step for establishing “Climate Smart Cocoa” initiatives in the GCFRP landscape is structuring criteria, parameters, and procedures that connect good-practices for cocoa production with accounting strategies for the emission reductions generated in the HIA landscapes. The data management system and the MRV system are being designed such that performance can be linked to HIA landscapes. The procedures for assessing good-practices and accounting methods should be organized and presented through a “Technical Protocol for CSC validation”. The protocol, which could also be referred to as a Standard, will be presented for public consultation and afterwards tested.

It is critical to note that the main purpose of the GCFRP and CSC should not be to only focus on the farm level outcomes, as even the most coordinated tool for assessment of good productive practices at the farm level (the cocoa certification standards) does not provide procedures for accounting deforestation in the landscape beyond the farm level. As has been observed, despite the focus on certification, deforestation rates across the landscape and within areas targeted with certification, have increased dramatically. Therefore, the CSC strategy across HIAs takes a broader view of the benefits and impacts of good-productive practices in the landscape. The purpose of the Standard is therefore to incentivize and validate a landscape approach to cocoa farming resulting in cocoa beans demonstrate livelihood and climate benefits.

After piloting the Protocol in one HIA area, the document should be updated, incorporating lessons learned and new comments and reviews. The final version will then be applied across the other HIA

and then the entire GCFRP area, generating indicators and indices for assessing the impacts and the efficiency of the GCFRP for reducing deforestation in the HFZ.

As a last step, the PMU may use a third-party auditing and verification process to assess the implementation of the Protocol by the HIA Consortiums, its applicability, as well as the results and performance of the GCFRP. Work is set to begin on this with key partners, including FC and Cocoa Board (government), Touton (private sector), Solidaridad and NCRC (NGOs) and the Verified Carbon Standard (VCS).

C. Increasing Yields via CSC

While the GCFRP aims to reduce the increasing rate of deforestation and forest degradation in the country, and in doing so demonstrate significant emission reductions over time, the programme's ability to demonstrate emission reductions rests upon hundreds of thousands of cocoa farmers and forest users changing their practices on the ground. This is no simple under-taking, and therefore the benefits to these land-users and land owners must be significant, clear, and consistent. The central logic of the programme is therefore to support cocoa farmers to significantly increase their on-farm cocoa production (and income) by giving them access to a suite of critical farming resources. Provision of these resources and the resulting yield increases at the farm level are the dominant benefit to people in the programme and therefore this pillar is of critical importance.

C1. Ghana CSC Good-Practices Guidelines (on-farm and off-farm)

Many organizations, companies and institutions are now interested in or are already applying climate smart cocoa projects and practices, as evidenced by Touton, Olam, Mondelez, IITA, SNV, NCRC, the FIP and other partners. However, to ensure uniformity and programmatic impact, the GCFRP will establish CSC Good Practices Guidelines that cover both on-farm and off-farm practices and activities aimed at increasing yields and incomes, contributing to mitigation, and enabling adaptation and resilience.

An expert working group, led by Ghana's Cocoa Board, will be established to review existing best practice recommendations for yield increases and sustainable cocoa farming, and assess landscape trends related to cocoa expansion, deforestation/degradation and climate change so as to draft the GCFRP CSC Good-Practice Guidelines. This draft will then be shared with major cocoa sector stakeholders and HIA consortium members (Implementing Partners) and consultations held so as to receive comments and critical input on the guidelines. With agreement, the expert working group will finalize the guidelines and consortium members and implementing partners will apply them in the HIAs.

The CSC Good-Practice Guidelines must address cocoa farming practices on-farm (e.g. farm establishment, planting material and sources, inputs and pest control, weeding, pruning, shade management) and respond to off-farm trends and actions that contribute to forest degradation and deforestation and increase threats to the forest and farming system (e.g. climate change, fires, etc). The guidelines should also support the monitoring of activities that are contrary to a CSC landscape—unplanned cocoa farm expansion, illegal cocoa encroachment into forest reserves, removal of mature trees during farm establishment, etc. It must also identify mitigation and adaptation measures that will enhance the resilience and sustainability of cocoa farming systems in the future.

C2. CSC Farmer Engagement Package in HIAs

The main benefit to farmers in the GCFRP will be their access to critical farming resources, resulting in increased yields and incomes. Therefore, each HIA CSC Consortiums must put together a CSC

farmer engagement package that gives farmers access to the agronomic, economic and knowledge resources to be able to achieve and maintain substantial yield increases. The logic is that access to the CSC package will come in exchange for farmers' compliance with the CSC Good-Practice Guidelines and the HIA's management plan, developed through the land use planning process and as supported by the Constitution.

The roles and responsibilities that align with the distribution of the package to farmers will be negotiated by the HIA Consortium members. It is possible that responsibilities could be shared between different members. For example an LBC, an NGO, and CHED could all provide extension services. It is also possible that each member will serve distinct roles given their unique technical and financial capacities. However, the consortium will need to ensure that over time, the package can be extended to all farmers within the HIA who want to engage.

The engagement package will include the following resources and benefits. Most of these resources are already available to farmers, however, not necessarily in a full package or at the scale required to achieve the needed impacts.

Access to planting materials: Cocoa farmers within each HIA will have access to hybrid cocoa seeds, seedlings, or other types of planting material that are recommended under the CSC Good-Practice Guidelines.

Access to inputs: A rapid assessment, coupled with information from previous initiatives, research and analysis, will determine soil fertility conditions and the dominant pests and diseases within the HIA. Based on needs, cocoa farmers within each HIA will have access to fertilizer (organic or inorganic) and pest/disease management products so that they can reduce losses and increase productivity on farm.

Access to technical extension: Cocoa farmers within each HIA will have access to technical extension and training opportunities to enable them to understand and follow the CSC Good-Practice Guidelines, improve their practices, and increase yields. A number of different extension, training, and/or demonstration models are available to some farmers, including farmer field schools, promoters or extension agents, and agricultural service providers. All of these models have proven successful in significantly increasing yields with different groups of farmers, however within the HIAs the main objective will be to ensure that all farmers who want to participate have access to training and extension.

Access to business extension: Cocoa farmers within each HIA will have access to professionalization services or business training opportunities so that interested farmers can realize and maximize benefits from yield increases through improved record keeping and financial literacy, enhanced professional capacity, and more detailed planning of their farm management.

Access to financial and risk products: While financial and risk management product remain limited in scale (credit) or non-existent (CSC insurance product), cocoa farmers within each HIA require access to credit facilities and risk management products to enable them to invest in recommended practices, purchase products and labor at the right time in the season, and reduce losses as a result of weather based events. Following the activities outlined in Section D, HIA consortium members and cocoa sector stakeholders will need to take immediate actions to develop a CSC insurance product. Once developed, cocoa farmers within each HIA will have access to credit facilities to support their farming practices and management decisions, and to an insurance product that will reduce the considerable risk of losses associated with changing rainfall patterns and temperatures.

Access to shade tree planting material and promotion of assisted natural regeneration and maintaining mature shade trees: Farmers within each HIA will be encouraged to maintain mature trees during land preparation/cocoa rehabilitation so as to conserve carbon stocks and provide recommended shade cover to their cocoa trees. Where on-farm shade cover does not exist or is inadequate, consortium members will promote assisted natural regeneration of shade trees into farmers, and farmers will have access to shade tree planting material.

Premium price on CSC bean: The aim is for cocoa farmers within the HIAs that have access to the CSC resource package, follow the CSC Good-Practice Guidelines, and adhere to the HIA's management plan and constitution will receive a premium price for the cocoa beans that they produce. Negotiations are being planned to discuss this opportunity with major international cocoa/chocolate stakeholders. Consortium members, led by key LBCs, other cocoa companies, and/or NGOs, will need to engage with Chocolate companies to negotiate a premium that validates the value of the GCFRP's climate smart beans. The basic purchase model for the HIA would involve cocoa purchased from registered farmers under contract to the Consortium following the official Cocoa Board price for the current season. In addition to the official price, each registered farmer would receive a Climate Smart bonus equal to 15% and the HIA Governance Board in which the cocoa bean was grown would receive payment of 10% for its role in the programme success and the funds would be invested in a trust fund. Bonuses would be paid annually on completion of all purchasing.

C3. HIA CSC Consortium implement package with cocoa farmers

The implementation process must begin through outreach and engagement within the HIA area. This includes adherence to traditional protocols and meetings with traditional leaders to introduce the programme and its broad aims. Following these traditional protocols, several workshops would be organized with local stakeholders to properly introduce the programme.

As part of this outreach, farmers will receive full, prior information about the CSC package and programme before being asked to make commitments to participate. Farmers who agree to participate in the programme are registered with the consortium and commit to implement the approved CSC Good-Practice guidelines and adhere to the HIA landscape management plan. As described above (Section C 2.3), farmers who are registered in the programme receive appropriate training from consortium members after their induction and at least every 2 years following induction. Farmers who successfully implement the guidelines are also entitled to receive a set of incentives (Engagement Package) including technical assistance, risk management tools (credit and insurance) and access to farm inputs. However, farmers who fail to implement the guidelines are withdrawn from receiving the programme supports. The HIA consortium member LBC(s) would benefit by developing farmer level contacts and would enter contracts with each farmer or via farmer groupings or associations.

Initial engagement would be followed by intensive training of every interested farmer and HIA member about the programme principles. The programme would begin registration of all committed cocoa farmers. GPS coordinates, area polygons and essential production model of all registered farms would be collected. All farms data would be entered on a GIS mapping of the target area which would confirm if any farms are inside the legal boundaries of established forest reserves. Any farms inside the legal boundaries of forest reserves would be identified for negotiated exit over an agreed time period, with re-establishment on alternate lands designated by the community/CREMA.

At the conclusion of the training and registration a Farmers Contract would be signed between the farmer, the HIA Governance Board and the licensed buying company consortium. All registered cocoa farmers would receive a photo ID card, an executed contract and regular training.

C4. Increase transparency in cocoa purchases

Since the 2004/2005 season, Ghana's Cocoa Board has guaranteed farmers a producer price of 70% of the F.O.B. price. In 2016, Ghanaian cocoa farmers were to receive GhC 425 per 64kg bag of cocoa, reflecting 74% of the net F.O.B. However, many farmers never receive this price due to the un-transparent practices of cocoa purchasing clerks at the community/society level who tamper with their scales, resulting in documented losses.

In communities surrounding Assin Fosu, in Central Region, for example, single sales of beans (not cumulative) resulted in weight losses to farmers that ranged from 5%-60%, with a median of 12% and mean of 16%. The economic losses associated with reduced weights ranged from GhC13 to GhC285, with a median of GhC80 and a mean of GhC95⁴⁵. Consequently, the single easiest way to increase farmers' income (and thus give them a benefit from the programme) is to ensure that farmers are paid fairly for the cocoa beans that they produce.

To increase transparency in cocoa purchases, the HIA consortium, and particularly the LBCs within the consortium will ensure that their purchasing clerks are adequately and fairly compensated for buying cocoa beans, they will ensure that all scales used for weighing cocoa beans are set accurately and they will spot check sales to check for compliance.

D. Risk Management/Finance

D1. Access to financial credit for CSC

One of the main strategies for reducing deforestation in the programme area is to increase funding and credit channels to foster good-practices for implementing climate smart cocoa production. The main goal is to allow the achievement of a "premium product" that attends to corporative demands for more sustainable supply-chains and products that are not leading to deforestation, forest degradation or poor social and labor conditions.

As a fundamental first step, the PMU will map available finance sources and credits lines that are already being accessed by farmers or could be accessed so as to channel vital credit to producers implementing CSC. Depending on the outcome of this mapping exercise, the PMU will work with experts and existing financial institutions to foster new credit programmes or increase the accessibility of current programme to farmers. The PMU will then work with industry experts to create a new facility or fund geared towards the development of more innovative and sustainable business plans focused in producing premium climate smart products. The GCFRP will take steps to explore financial "guarantees" for Consortium members, investors, and stakeholders engaged in the roll out or adoption of CSC programmes.

D2. Access to yield insurances

Currently, one of the main threats to sustained adoption of recommended practices and application of inputs is climate change. Farmer associations and organizations that provide extension and inputs to farmers have already found that when farmers make investments into their farms but then fail to realize the expected productivity gains due to long dry periods or low rainfall the farmers tends to abandon future investments and practices to avoid the associated risks. Considering that changes in rainfall patterns and temperature are expected across the cocoa

⁴⁵Oxford University and NCRC, unpublished data. Ghana Eco-Limits Project. Ecosystem Services for Poverty Alleviation Research Grant Programme (ESPA).

growing in the near and long term as a result of climate change, farmer access to insurance products that help them to better manage such risks is critical to the success of the programme.

Recent research by McKinley⁴⁶ has shown the potential value of a climate-smart cocoa insurance product for Ghana. In assessing how yields are affected by the adoption of key CSC practices and the feasibility of a crop insurance product, the authors found that across 19 districts, producers who followed the CSC recommended practices had higher estimated yields by 19-25%, were 5-25% less likely to have a yield loss large enough to receive an insurance payment, and the total expenses associated with indemnity payments in an insurance programme were 20% less for CSC farmers.

Therefore, the GCFRP and its HIA stakeholders and partners will work together to develop an insurance product which can be rolled out across the various HIAs. To do this, the GCFRP will need to secure access to historical yield data and weather data so that insurance companies can assess the overall risk and parameters of a potential product. The private sector cocoa companies in Ghana have decades of yield data and farmer practice data which consortium members and other interested parties could make available for the purpose this purpose. Ghana's Cocoa Board and the JCC will lead in engaging these stakeholders to make their data available. Historical weather data can be obtained by Ghana from multiple sources for free, including the Ghana Meteorological Association and AWhere Inc.. When historical yield and weather data is available, then the GCFRP leaders and key stakeholders will identify insurance companies who are interested in assessing and developing a CSC product for the GCFRP. The GCFRP will then need to guarantee funds for insurance premium payments for short-term piloting and long term roll-out. The next step will be to pilot and test a CSC insurance product in one of the HIAs, and assuming a successful outcome, to implement the insurance product across all HIAs and eventually the entire programme area.

D3. Marketing additional ERs above FCPF

Once the ERPA period is finished, the GCFRP should package and present its potential for generating emission reductions beyond 2021 to potential funding alternatives as:

- (i) Green Climate Fund: Ghana must indicate the institution that will represent the country at the GCF and will be responsible for presenting projects and local initiatives to be financed by the UNFCCC financial mechanism in the post-2020 scenario. The GCFRP must have close communication and cooperation with the indicated agency, for guarantee that additional long term funds could be channeled to REDD+ and to the HFZ.
- (ii) Private investors: Looking for new business plans that are able to deliver CSC ("Ghana premium cocoa") plus emission reductions in the long-term
- (iii) Impact investments: for channeling resources to innovative initiatives that intend to change the business-as-usual scenario of forest degradation and poor agriculture and production techniques in the HFZ

D4. Branding and Marketing Ghana CSC Sustainability Standard beans

In parallel to climate finance strategies, the PMU, JCC and NRS, under the guidance of Cocoa Marketin Company (CMC) (with affiliation to Cocoa Board), will foster the development and marketing of a Ghana CSC brand that could create new opportunities for trading a "premium product" on the international market. There is a growing demand worldwide for climate friendly products that are not associated with deforestation. This demand is motivated by the urgent crisis of climate change, and growing awareness amongst consumers all around the world that products

⁴⁶ McKinley, J., Lanier Nalley, L., Asare, R.A., Dixon, B.L, Popp, J.S., D'Haese, M. 2016. Managing risk in cocoa production: Assessing the potential of climate-smart crop insurance in Ghana. *Journal of International Agricultural Trade and Development*, Vol. 10:1.

should not be contributing to deforestation. Good examples of the potential for climate friendly products can be found in portals like [Canopy Bridge](#), [Landscapes.Org](#), [Rainforest Alliance](#) and others.

The first step for moving this initiative forward will take place in September in a meeting with GCFRP proponents and the CMC. From there, the programme will need to develop market studies about the current demand for Ghana's Climate Smart Cocoa and create a national brand for recognizing good practices and allowing access to more conscious markets and consumers. The next step will then be to stimulate demand for Ghana's CSC at the international market, selling the product as a "premium" cocoa bean.

D5. Sustainable Finance of HIAs

A key aspect of the long term success of this programme will be to ensure that each HIA target area has a sound financial foundation. In order to establish a firm foundation, each HIA will enhance revenue streams from cocoa, NTFP harvesting, other perennial tree crops, and climate finance. It will manage its operating expenses well within its income levels and it will establish a trust fund which will build up reserves to ensure long-term stability.

Each HIA will require a 5 year grant to support the costs of establishment including covering expenses for the initial 5 years and seeding the trust fund. Real revenue streams must be developed to ensure that the HIA has diversity in its financial sources estimated to achieve significant levels within 5 years. Expenses will need to be controlled to ensure a positive balance sheet at the end of each financial year. In addition long-term sustainability will be linked to the HIA having a successfully managed trust fund which can support targeted activities beyond the scope of annual finances and as a security in difficult years when revenues suffer unexpected dips.

The HIA expects to develop five types of revenue: climate-smart cocoa premiums, wild harvest NTFP premiums, other tree crop premiums, climate finance, and grant revenues. From the beginning grant revenue will be critical to kick things off but this should rapidly transition into wild harvest NTFP premiums, CSC premiums (or other tree crops) and climate finance.

It is expected that a foundation grant will be provided to allow for the formation of the HIA finances and the early implementation of the NTFP and CSC activities. Third party private sector companies will be involved in aspects of this implementation but there will be many activities which the private sector will not be prepared or willing to finance. It is anticipated that grant money will support this period of approximately 3-5 years. At the end of the grant period the HIA will not require external financial support for recurrent activities.

By year 2, NTFP related funds will begin to flow to HIA farmers/community members and into the HIA accounts in direct payments. A negotiated portion of any premiums will be paid directly to the HIA Trust Fund account in Accra as outlined below. By year 3 and 4, CSC related funds will begin to flow to HIA cocoa farmers and a negotiated portion of premiums will be paid directly to HIA accounts and trust fund. The HIA expects expenses to follow the categories of expenses include HIA staff salaries, meeting costs, transport, training programmes, utilities for offices and office rent.

The HIA will establish a financial trust fund under the management of third party professional money manager in Accra. The fund will be at arm's length from the HIA Management Board through structural arrangements that allow for withdrawals within pre-agreed thresholds thus avoiding unauthorized withdrawals which would hamstring the future operations of the fund. Ideally the fund would be established with the full or partial grant under the formation stage.

Following the establishment of the fund, no withdrawals will be permitted until the fund surpasses a foundation valuation of the principle. Thereafter, no withdrawals will be permitted should the principle fall below the foundation valuation target. This target figure will be adjusted from time to time based on overall performance and macro-economic conditions prevailing in Ghana.

If the Trust Fund is fully seeded as outlined then the HIA Board will be able to request withdrawals not exceeding the financial managers' recommendation for the year which will be based on overall performance of the fund and prevailing macro-economic analysis.

E. Legislative and Policy Reforms

E1. Passage of Legislation

The quick passage of the Wildlife Resources Management Bill, 2014 will be essential to the overall success of the programme as several key issues in the Bill are important for increasing communities' rights to benefit from their natural resources. The Bill is on the schedule of bills to be passed by the current Parliament which will end in 2016, but passage is not guaranteed. Therefore, under this sub-activity the programme will lobby for the passage and implementation of this Bill. This will be achieved through strategic support to the Parliamentary Sub-Committee on Natural Resources. Through the initial three years of the programme, support will be available to host the Sub-Committee for field visits and formal engagements to ensure their support and lobby within Parliament.

E2. Policy Reform and Guidance to Policy Implementation

There are three areas of necessary policy reform or guidance to support implementation of the current policy which has yet to be implemented effectively. These areas are outlined in the sections below: tree tenure reforms, carbon transaction rights and benefit-sharing arrangements and cocoa farm input arrangements.

Tree tenure reforms: The Forest and Wildlife Policy which backs the Bill mentioned above is progressive and provides the necessary structure for implementation of the required tree tenure reform, but guidance and support is necessary for success. The programme will support the process of having all the HIAs approved by the FC to pilot new tree tenure arrangements within the target areas. A number of such tree tenure reforms have already been piloted in Ghana including the tree passport system (IUCN Ghana), and the CREMA devolution process. The implementation of such activities will be conducted under section C of the plan above but the programme will support independent studies within HIAs on such implementation of tree-tenure arrangements which will result in the preparation of official FC tree-tenure policy implementation guidelines.

Clarification of carbon transaction rights + benefit-sharing agreements for GCFRP: The Forest and Wildlife Policy which backs the Bill mentioned above is progressive and provides the necessary structure for clarification of carbon transaction rights and benefit-sharing agreements but requires guidance for successful implementation.

The programme will promote the completion of on-going assessments that clearly state the ownership of carbon credits transactions. In general terms, the ownership of carbon rights doesn't have to necessarily align with the land owners. Rather, it suggests that the GCFRP will have to finalize and present an innovative benefit sharing agreement that is agreed by MLNR, traditional authorities, District Assemblies, CREMAs, others, allowing that carbon transaction rights flow to the HIAs and other areas that are implementing CSC strategies and reducing deforestation in the programme landscape.

The process has started with the development of an independent assessment on carbon transaction rights at multiple scales, which is expected to be completed by August. Work is set to begin on defining a BSP, which will be followed by public consultation to present and validate the proposal, formal agreements among the different scales and independent review on the innovative carbon transactions proposal. The goal is to have a benefit-sharing approach that allows that REDD+ benefits flow to the HIAs that are implementing CSC techniques on the ground - in partnership with local farmers - and performing in terms of reducing deforestation in the HFZ landscape.

Reform of cocoa farm input system: Ghana's Cocoa Sector Strategy II was developed and drafted in 2014 and 2015 through a consultative processes that involved a wide range of stakeholders. The draft sector strategy calls for, amongst other things, (i) increased production and distribution of free hybrid seedlings, (ii) a phased approach to fertilizer liberalization in which fertilizer is made freely available to farmers through the *hi-tech* programme up to 2017, and then a phased withdrawal to increased, direct distribution of recommended fertilizers at market prices, (iii) increased and direct distribution of chemicals for disease and pest control with a focus on accessibility and timely availability at market prices, and (iv) the development of private sector spraying gangs as business entities who provide services to farmers.

The validation and approval of the Cocoa Sector Strategy II has been delayed, but is expected to occur in 2017. The validation and passage of this sector strategy is critical to the success of the programme and its climate-smart cocoa activities because it will provide clear sector-level policy support on specific issues and activities to the programme. For CSC to deliver yield increases, improved resilience and reductions in deforestation farmers must have equal access to farm inputs at fair prices and in a timely manner. Resources from the programme will be made available to support the passage and implementation of the cocoa sector strategy.

E3. Modification to Customary Norms and Practices

The vast majority of landholding in Ghana is under the control of traditional governance structures and follows customary norms and practices. There are very broad systems of farming within the traditional systems but these vary from location to location. A number of these traditional systems have perverse incentives to climate-smart cocoa farm management. This is particularly so in the case of settler farms throughout the cocoa programme area.

The programme will support dialogues and negotiations in each of the HIAs to seek pathways to promote an evolution away from perverse incentives in traditional land-use practices which directly affect cocoa farming. The programme recognizes that this process will take different pathways across the set of HIAs and will thus support independent studies in HIAs to identify perverse land use norms. The programme will support negotiation with traditional leaderships at HIAs level and will encourage progressive traditional leaders to experiment with such change. The programme will support independent review on implementation of land use reforms.

4.4 Analysis of laws, statutes and other regulatory frameworks

Please describe the land and resource tenure regimes in the Accounting Area based on the assessment carried out during the Readiness phase and, if applicable, an additional assessment of any issues related to land and resource tenure regimes in the Accounting Area that were considered critical for the successful implementation of the ER Programme.

If any additional assessment of land and resource tenure regimes in the Accounting Area was

necessary, provide the outcome of this assessment including:

The range of land and resource tenure rights (including legal and customary rights of use, access, management, ownership, exclusion, etc.) and categories of rights-holders present in the Accounting Area (including Indigenous Peoples and other relevant communities);

The legal status of such rights, and any significant ambiguities or gaps in the applicable legal framework, including as pertains to the rights under customary law;

Areas within the Accounting Area that are subject to significant conflicts or disputes related to contested or competing claims or rights, and if critical to the successful implementation of the ER Programme, how such conflicts or disputes have been or are proposed to be addressed; and

Any potential impacts of the ER Programme on existing land and resource tenure in the Accounting Area

Please elaborate how the additional assessment has been conducted in a consultative, transparent and participatory manner, reflecting inputs from relevant stakeholders.

Please describe any relevant issues gaps, conflicts, contested claims and potential impacts related to land and resource tenure regimes in the Accounting Area that have been identified and that are considered critical for the successful implementation of the ER Programme and explain how these have been or will be taken into consideration in the design and implementation of the ER Programme.

Refer to **critterion 28, indicators 28.1 and 28.2** of the Methodological Framework

Ghana's readiness process has focused considerable attention on the issues of land and resource tenure. As part of the R-PP, an assessment of land use, governance and forest policy was conducted⁴⁷ and the National REDD+ Strategy thoroughly describes land and resource tenure issues within the context of governance and implementation of emission reductions programmes⁴⁸. Both the R-PP and the National REDD+ Strategy went through multiple consultations and editing processes that involved a cross-section of experts. The following description of land and resource tenure in the GCFRP accounting area is based upon this existing work and does not reflect an additional assessment.

There are two predominant land tenure systems in the accounting area of the GCFRP; customary land and statutory or public land. Land held under customary law is owned by stools, families or clans and is usually held in trust by the chief, head of family or clan for the benefit of its members. Customary land predominates, accounting for over well over 80% of the land in the programme area Ghana. Ownership of public lands, on the other hand, is vested in the President on behalf of and in trust for the people of Ghana. This land tenure regime is much less common in the programme area with national parks representing one such example. Private lands are extremely uncommon as a land tenure regime in the accounting area.

Under the customary system, there are different levels of ownership rights, the fullest level being the *allodial title*, referring to land which is vested in the whole community and is commonly referred to as stool lands or skin lands. The second type of ownership recognized under Ghanaian customary law is a *usufructuary title*; a concurrent and lesser title that individuals or families may hold on stool land, which cannot be divested without the consent of the allodial owner. The third level of customary ownership is pledged or rented land, reflected in the common share-cropping tenancy agreements of *Abunu* and *Abusa*. According to these arrangements, land is cleared, rehabilitated and/or cultivated by the tenant farmer and then the land or the crop is shared between the tenant and the landowner. This type of customary land title is supported by Section 19 of Land Title

⁴⁷ GoG. 2010. R-PP.

⁴⁸GoG. 2015. National REDD+ Strategy.

Registration Act, 1986(PNDCL 152 and includes the *Abunu* and *Abusa* as being vested in the stool to be granted to the local communities, farmers, or inhabitants.

With respect to forest resource, Article 269 of the 1992 Constitution provides for the establishment of the Forestry Commission and its functions, and gives the State control over all natural resources of Ghana, decoupling them from the land, and stipulating that natural resources are to be vested in the President on behalf of and in trust for the people as a whole.

Forest reserves and the forest and other natural resources found within the accounting area are thereby protected by the state and are managed by the government (e.g. Forestry Commission, Minerals Commission) in trust for the stool landowners. Protection of the forest estate, however, does not affect landownership, meaning that though forest reserves and timber are managed by the FC, the land is owned by communities (the people) as represented by their chiefs and traditional authorities.

With respect to ownership and commercial exploitation of trees, Ghanaian law makes a distinction between naturally occurring and planted trees. According to the Timber Resources Management Act, 1997(Act 547) and the Timber Resource Management Act, 1998(Act 547), the economic rights to naturally occurring timber trees, whether on-reserve or off-reserve, are vested in the state and it is a statutory offence to harvest these trees without the consent of the state. However, timber trees may be felled for non-economic reasons, such as clearing forested land for agricultural purposes. In addition, section 4 of the Timber Resources Management Act as amended by Act 617 in 2002 clearly states that timber rights do not apply to land with private forest plantation or land with timber grown or owned by an individual or group.

The revenue from timber and other natural resources is shared in a constitutionally agreed benefit sharing arrangement. On Stool Lands (off-reserve) where resources are managed and extracted by the requisite commission (e.g. Forestry Commission) benefit sharing arrangements have been put in place between the state, the stool, the traditional authorities, the Office of the Administrator of Stool Lands and the District Assembly. On-reserve, the same arrangements apply, however a slightly higher percentage of the stumpage fee (revenue) is allocated to the Forestry Commission (sixty percent as compared to fifty percent).

Ghana is actively working to address critical gaps for the programme related to land and natural resource tenure. These include tree tenure reforms and an adapted benefit sharing arrangement such that the land owners and users are adequately incentivized to retain naturally regenerated trees on farm and in the farming landscape. As progress is made on these reforms, the Community Resource Management Area (CREMA) provides a clear process and mechanism by which to ensure that the right to benefit from forest resources rests with the land owner and land users through the establishment of a CREMA and the issuance of a certificate of devolution by the sector Minister. This community-based natural resource management mechanism is supported by the 2012 Forest and Wildlife Policy and is being implemented and practiced in more than 35 locations across the country, including within the GCFRP accounting area. Of critical importance is that this CREMA mechanism is positioned to receive full legal backing through the passage of the Wildlife Resources Management Bill (2014), which is currently before Parliament and slated to be voted upon this year. Passage of this law would constitute the final step in legalizing CREMA.

Finally, to avoid the possibility of unwanted contested claims to land due to overlapping statutory and customary regimes in the GCFRP area, it is important for customary law to be incorporated into mechanisms for public administration of land to provide investors assurance, certainty on land ownership rights in Ghana and implementation of REDD+.

4.5 Expected lifetime of the proposed ER Program

Please provide an analysis of the planned ER Programme Measures in the context of relevant local, regional and national laws, statutes and regulatory frameworks, including relevant international conventions and agreements. Please identify any potential compliance issues of the actions and interventions with these laws, statutes, regulatory frameworks, conventions and agreements; and identify legal and regulatory gaps. If applicable discuss how these issues will be addressed.

The activities of the GCFRP are consistent with international treaties and covenants ratified by the Republic of Ghana as well as relevant domestic legislation. Ghana is a signatory or has acceded to a wide range of **international conventions** in the field of human rights, environmental justice, and climate change, including: the United Nations Framework Convention on Climate Change of 1992, the Kyoto Protocol of 1997, the Paris Agreement (adopted within the UNFCCC in 2015, signed by Ghana in April 2016), The Convention on Biological Diversity (CBD) of 1992, and Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity, a 2010 supplementary agreement to the CBD, the UN Convention on the fight against desertification in countries seriously affected by drought and / or desertification, particularly in Africa (UNCCD) of 1994, the International Tropical Timber Agreement of 2006, the Convention on Wetlands of International Importance (“Ramsar Convention”) of 1971, the Revised African Convention On the Conservation of Nature and Natural Resources (“Maputo Convention”) of 2007, the Convention of the Elimination of All Forms of Racial Discrimination of 1966, the Indigenous and Tribal Populations Convention of 1957, and the African Charter on Human Rights and Peoples’ Rights of 1989.

At a **bilateral and regional level**, Ghana engages in a wide range of treaties and policy initiatives, including the Forest Law Enforcement, Government and Trade (“FLEGT”) Initiative led with the European Union. Under the **Ghana FLEGT Programme**, the Government of Ghana signed a Voluntary Partnership Agreement in 2009 (entry into force the same year).

At the **domestic level**, section 4.4 describes land and natural resource tenure, while the main laws of relevance for the existing land tenure regimes in the programme accounting area are summarized below in Table 6.

Table 6: Analysis of resource tenure laws and their relevance in the accounting area

Statutory Basis	Relevant Amendments and Implementing Acts	Relevance for the Tenure Regime	Relevance for the GCFRP Accounting Area
Constitution 1992	Relevant Laws and Regulations (see below in this table)	<ul style="list-style-type: none"> • Private tenure rights guarantee; • Collective customary rights guarantee for stools and skins) of allodial title to land with provisions on self-governance; • Constitutional separation of land and commercial resource; management, which is vested in the central government; • Complementary right of stools and skins to revenues from resource management; • Establishes the Forestry Commission; 	<ul style="list-style-type: none"> • Provides basis for participation of local communities; • Provides basis for REDD+ governance; • Provides point of departure for benefit sharing arrangements;
Local Government Act 1993, (ACT 462)		<ul style="list-style-type: none"> • Formalizes customary governance forms (including “traditional authorities”, which are defined as a House of Chiefs or a councilor body established or recognized under 	<ul style="list-style-type: none"> • Provides an institutional basis for the REDD+ governance framework (within local

		<p>customary law”);</p> <ul style="list-style-type: none"> Establishes new forms of local government, including the governance through “district assemblies” 	<p>communities);</p>
Chieftancy Act 2008		<ul style="list-style-type: none"> Implement Article 271 of the Constitution; Set governance rules for the National and Regional Houses of Chiefs 	<ul style="list-style-type: none"> The Regional House of Chiefs responsible for the Accounting Area can decide whether to support the ERP or not and make, if they do, a formal commitment of support (also confirming the Benefit Sharing Plan).
Office of the Administrator of Stool Lands Act of 1994, (ACT 481)		<ul style="list-style-type: none"> Establishes the central government authority acting on behalf of stools; 	<ul style="list-style-type: none"> May receive a share of the REDD+ benefits for administrative purposes;
Administration of Land Act of 1962, (ACT123)		<ul style="list-style-type: none"> Provides details on the management of stool lands and of land proceeds; Permits the use of land for public purposes; Limits the maximum duration of timber and mining to 30 years; Allows for the enforcement of land tenure title and illegal land occupation; 	<ul style="list-style-type: none"> Gives further guidance to the institutional set-up of the REDD+ Program (including the involvement of forest recognized stakeholders); Allows for the enforcement of illegal holdings within the Accounting Area;
State Lands Act of 1962 (ACT 125)	State Lands Regulations of 1962 (LI 230)	<ul style="list-style-type: none"> Permits the acquisition of land by the President “in the public interest”; Allows the President to grant a lease or license for thus acquired land; 	<ul style="list-style-type: none"> Serves as the legal basis for some of the public-owned areas in the Accounting Area;
Land Title Registration Act of 1986, (PNDCL 152)		<ul style="list-style-type: none"> Legal basis for the registration of recognized titles to land, including allodial titles of (of stools and other), freehold, and leases; 	<ul style="list-style-type: none"> Gives clarity on the actual land tenure holdings in the Assessment Area; The registry is not considered complete, however; thus, not all title conflicts will be able to be solved on its basis;
Forest Ordinance of 1927	<ul style="list-style-type: none"> Forest Protection Decree 1974 (NRCD 243) 	<ul style="list-style-type: none"> Establishes the Forest Reserve (“On-Reserve”); Forest Protection Decree: Defines individual obligations for Forest Reserve Areas; 	<ul style="list-style-type: none"> The On-Reserve covers a 21% of the GCFRP Accounting Area;
Forestry Commission Act of 1999 (ACT 571)		<ul style="list-style-type: none"> Specific legal basis giving a mandate and institutional structure to the Forestry Commission, which is responsible “for the regulation of the utilization of forest and wildlife resources, the conservation and management of those resources and the coordination of policies related to them” (§ 2); this relates to forest resources within Forest Reserves and outside („off-reserve”); 	<ul style="list-style-type: none"> The Forestry Commission is the main operational stakeholder for the ER Program;
Concessions Act of 1962 (ACT 124)		<ul style="list-style-type: none"> Confirms that natural resource management is in the hands of the central government (represented by the minister assigned by the President); Clarifies that all rights with respect to timber or trees on any land are vested in the President who holds them “in trust” for the 	<ul style="list-style-type: none"> Gives the FC and MC rights to the forest and mineral resources in the programme area.

		<ul style="list-style-type: none"> stools concerned; Lays out the general process for concession granting (including legal review); Extends the application of the Forest Ordinance <i>mutatis mutandis</i> to timber resources outside Forest Reserves (§ 16.6); 	
Trees and Timber Decree of 1974 (NRCD 273)	<ul style="list-style-type: none"> Trees and Timber (Amendment) Act of 1994; (ACT 493) 	<ul style="list-style-type: none"> Imposes registration requirements for timber exports as well as export levies; Allows for the creation of forest protection zones outside the Forest Reserves; 	<ul style="list-style-type: none"> Relevance for timber concessions;
Timber Resource Management Act 1998 (ACT 547)	<ul style="list-style-type: none"> Amendment of 2002; Timber Resources Management (Amendment) Regulations of 2003; (LI 1721) Timber Resources Management (Legality Licensing) Regulations of 2012; (LI 2184) 	<ul style="list-style-type: none"> Defines the terms and the process under which a person can apply for a timber right, concession or lease; Requires timber right holders, following an award, to conclude “Social Responsibility Agreements” with local communities to plan and finance community services from 5% of the value of the stumpage fees; The 2012 amendment regulations implement the FLEGT process for Ghana; 	<ul style="list-style-type: none"> Relevant legal basis for the timber concessions given out for portions of the Accounting Area; Social Responsibility Agreements can serve as a model for the negotiation of benefit sharing agreements; Civil society approach of the 2012 amendments should inspire the stakeholder participation process;
Forest Plantation Development Fund Act of 2000 (ACT 583)	<ul style="list-style-type: none"> Forest Plantation Development Fund Amendment Act of 2002; (ACT 623) 	<ul style="list-style-type: none"> Incentive mechanism for the development of forest plantations on lands suitable for timber production; 	<ul style="list-style-type: none"> Creates incentives for CSE within the GCFRP area.
Minerals and Mining Act of 2006 (ACT 703)		<ul style="list-style-type: none"> Regulates the award of mining rights and defines the content and their limits; 	<ul style="list-style-type: none"> There are a number of mining locations in the Accounting Area (with mining rights given to companies);
Timber Resource Management and Legality Licensing Regulation	LI yet to be passed	<ul style="list-style-type: none"> This LI is expected to regulate import and export of timber products to and from Ghana; control the trade of illegally harvested timber products and illegal logging; improve opportunities for and regulation of small-scale timber harvesting, and support the issuance of FLEGT licenses. 	<ul style="list-style-type: none"> Timber Resource Management and Legality Licensing Regulation
Wildlife Resources Management Bill	Bill yet to be passed	<ul style="list-style-type: none"> This Bill is expected to consolidate and revise the laws relating to wildlife and protected areas, provide for the implementation of international conventions on wildlife, and provide legislative support for CREMAs. 	<ul style="list-style-type: none"> Wildlife Resources Management Bill

A specific regulatory and land tenure related challenge within the GCFRP accounting area concerns the high number of illegal mining operations. While the regulatory context is clear – minerals are owned by the State; all mining requires a license or lease; an operative agency “to supervise the proper and effective implementation of the provisions of Section 100 of the Minerals and Mining Act, 2006 (ACT 703) is established; and certain violations are deemed criminal offenses – enforcement is weak, with the Minerals Commission not having the capacity to exercise control.

The GCFRP aims at mitigating this challenge, over time, capitalizing on soft approaches that will strengthen the social infrastructure as a whole and by increasing the level of involvement from, in particular, the stools and the traditional authorities. Though they have no direct powers to go after illegal operators, they are extremely influential in affecting how land is allocated for use. With wider support, traditional authorities can invoke the power of the ancestors to prohibit certain land uses on lands under their jurisdiction. The traditional leaders, including chiefs and queen mothers, are also able to engage other levels of governance, including Parliamentarians, Ministers, the Mining Commission, the police to demand action.

A general regulatory and tenure related challenge – relevant not just in the Accounting Area but across Ghana – concerns the strict separation between land tenure, on the one hand, and natural resource tenure, on the other hand. This leads to a lack of ‘owner protection’ from stools, in particular, and exposes forest resources to the ‘tragedy of the commons’: a resource perceived as freely available to anyone. To be sure, stools have a claim to portions of the “revenues accruing from stool land”, but as shown above, this claim is restricted in scope (net cash revenues), by share (most of the proceeds go to government bodies), and, importantly, it gives the stools little say and leverage over the resource governance process. They are at the recipient of benefits; they do not administer the forest.

This separation of land and resource has a long tradition in Ghana, and the ER Programme will not be able to do away with it. However, by involving stools and other stakeholders directly in the process of resource management and by enhancing the social infrastructure as a whole, the underlying problem stands a good chance to be effectively mitigated.

4.6 Expected lifetime of the proposed ER Programme

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Please describe the period over which the planned actions and interventions under the ER Programme will be implemented, including proposed start and end dates.

The expected start date and signing of the ERPA will be 2017, with a proposed programme lifetime of 20 years (2017-2037).

The GCFRP programme is truly unique and ambitious in its goal to reduce the environmental and climatic externalities of cocoa production, while also reducing emissions driven by other agricultural systems, illegal logging, and illegal mining through the implementation of a series of integrated landscape-level activities and policy reforms via consortiums of key stakeholders, investors, landowners and land users.

However, the proponents of the GCFRP also acknowledge that motivating large-scale behavior changes and reforms is not easy and will not be possible across the entire accounting area at the start. Therefore Ghana anticipates that the initial volumes to the CF will be modest (approximately 5 million tCO₂e) compared to the CF’s desired goal of 20 million tCO₂e by 2020. However, in light of Ghana’s recent deforestation *trend* and 2015 emissions, the effort required to achieve a 50% reduction in emissions, just to get down to the reference level will be substantial and make the landscape value of the ERs sold much greater.

It is expected that the long-term volumes of ERs from the programme will be significant—391 MtCO₂e. The programme proponents are equally confident that there is real value in implementing this programme because it marks the beginning of REDD+ implementation in Ghana, it leverages and influences significant private sector investment in the cocoa sector, it leverages the FIP investment, it will test an innovative strategy for reducing emissions driven by agriculture and other drivers that

is highly scale-able to other eco-zones (nationally) and to other countries where globally important commodities are driving deforestation, and it will add real diversity and learning value to the FCPF and the Carbon Fund's portfolio.

The overall lifetime is divided into three (3) phases, as described below:

1. *Early Implementation and Solidification (2016-2018)*: Though an ERPA will not be signed with the CF until mid-late 2017, Ghana will begin to implement the programme in the first HIAs (in at least 3) by the middle of 2016, with ready support from the FIP and the private sector cocoa company Touton. During the first 6 months, solidification of other consortium groups for selected HIAs will happen and key details on benefit sharing, tenure reforms, data management, and other aspects of implementation will be agreed and validated. This will first phase will also serve as the period in which administrative bodies are resourced and staffed, coordination is planned, consultations with communities and traditional leaders takes place, and additional grant resources are confirmed or requested. By the end of this phase the majority of the HIAs and consortiums should be operational.
2. *Full Implementation for Performance-Based Carbon Fund Payments (2019-2025)*: During the second phase, full scale implementation will happen within the target HIAs within the accounting area. The first monitoring is proposed for 2020, three years after signing the ERPA, followed by a subsequent monitoring of ERs against the REL in 2023 and at the end of 2025. Assuming that the monitoring activities demonstrate strong performance, three payments would be made for emissions reductions generated during the time period from the Carbon Fund. Ghana reserves the right to sell emission reductions to other potential buyers should emission reductions exceed quantity contracted to the CF.
3. *Post Carbon Fund Implementation for Performance Based Payments (2026-2037)*: Phase 3 marks the transition to the final 11 years of the programme. With the established experience in reducing deforestation and degradation and the accumulating CSE from planted trees, the magnitude of ERs is expected to increase. Post CF, the programme expects to engage with potential new investors (fund-based, bilateral, or private sector), and it reserves the right to transfer ERs towards to achieve Ghana's NDC. If it has not happened already, scaling-out to new HIAs within the programme landscape will occur, incorporating needed adaptations based on experiences and results.

5. STAKEHOLDER CONSULTATION AND PARTICIPATION

5.1 Description of stakeholder consultation process

Please describe the stakeholder information sharing and consultation mechanisms or structures that have been used in the design of the ER Programme, including the identification of the priority Non-Carbon Benefits, the implementation of necessary safeguards and so forth. As part of this description, explain how the information sharing and consultation mechanisms or structures were in a form, manner and language understandable to the affected stakeholders for the ER Programme.

Separately, for the implementation phase of the ER Programme, provide an overview of the plans for consultations and meetings, a description of publications and other information used and the mechanisms for receiving and responding to feedback, in order to show how the consultation process will be structured and maintained during this phase.

Describe how the sum of these actions will result in the full, effective and on-going participation of relevant stakeholders. Provide information on how the process builds on the stakeholder outreach and consultation process implemented as part of national REDD Readiness activities.

*Refer to **critterion 24, critterion 28, critterion 31 and indicator 34.2** of the Methodological Framework*

During the planning and design of Ghana's ER Programme, a wide range of stakeholders have been targeted and consulted to contribute and participate in the process. This information sharing has been done through cross-sector meetings, workshops, sensitization, capacity building, durbars conferences and training programs. The purpose of these interactions has been to disseminate information and seek feedback, enhance capacity and build knowledge and expertise on REDD+. Over forty (40) institutions from government, NGO, the private sector, civil society, research and the donor communities have participated in consultations on a regular basis. Also community representatives from across the various regions within the ERP have been consulted. Besides the widely discussed financial carbon benefits, the issues in the agenda for discussion during stakeholder consultations are also focused on several non-carbon benefits that include; sustainable agriculture, ecotourism, biodiversity conservation and management of ecosystem services, social infrastructural development, provision of alternative livelihoods, sustainable utilization of non-timber forest products and food crop benefits before canopy closure.

Under the first phase of REDD+ Readiness, a number of consultations were undertaken to design a Strategic Environmental and Social Assessment (SESA) framework to identify risks and find appropriate mitigation measures. Further consultation is underway to identify the likely risks, impacts and benefits from the proposed ER program interventions to ensure that the Cancun Safeguards are implemented with the participation and involvement of local communities.

The design process for Ghana's ERP has specifically sought to follow the Bali Action Plan which calls on REDD+ countries to engage stakeholders in designing and implementing REDD+ actions. It has also sought to ensure compliance with the COP16 decision that key safeguards should be "promoted and supported," including the full and effective participation of relevant stakeholders, in particular, indigenous peoples and local communities. Ghana's R-PP also emphasizes the importance of actions that promote "consultation and participation", which was identified as a sub-component under readiness arrangements (i.e. component 1). A REDD+ Communications Strategy was therefore developed at the very outset of the implementation of the R-PP, and REDD+ communication activities have been implemented at three levels—local/district, regional, and national. The selected regions for the ERP are mainly Akan speaking people and therefore the media of engagement with the local communities will be Twi to ensure ease of understanding information being shared. The channels of communication will include the use of radio, posters, banners, handouts, newspapers and street announcements. Key activities have included: Community level consultations within the ERP area; REDD+ Roadshow events; REDD+ sensitization programmes for FC frontline staff in all regions of the country; national level consultation with the National House of Chiefs and the National REDD+ Forum. The NRS as much as possible includes a good representation of women on all consultative meetings to ensure gender equity, and gender considerations have been mainstream into all elements of the GCFRP.

The participation and feedback that this process has generated, has gone a long way to improve the ER Programme's design and ensure that it is realistic and achievable. Areas in which the programme received valuable and important feedback include issues relating to the following: engagement of all stakeholders at all levels across the landscape with particular role of traditional authorities; addressing land use planning with the integration of ERP intervention into the District Assembly development plans; sustainability of the program; learning from existing COCOBOD safeguards system including extension services and benefit sharing mechanism; source of funding with particularly attention to domestic sources; and addressing challenges associated with the use of FPP

data as well as incorporating post 2010 issues of deforestation and degradation in reference level calculation.

It is worth highlighting that private sector engagement kicked off with an informal meeting to present the broad vision for Ghana's ERP to a small group of stakeholders in early 2014 through a consultation workshop organized for a cross-section of key high-level stakeholders considered to be of significant relevance for the design and implementation of the ERP. At the end of the event, a communique was issued by the group expressing their commitment to the development and implementation of the programme so as to make the cocoa sector climate-resilient through the promotion of climate-smart interventions across the forest-cocoa mosaic landscapes within the high forest zone of Ghana. Subsequent to this initial meeting with private sector players, a series of stakeholder consultation meetings have been arranged to secure and deepen private sector buy-in for the ERP.

As part of the preparation of the ERPD, major private sector actors (Touton, Olam, Mondelez, Armajaro etc.) specifically signaled their willingness to participate in the ERP implementation. They have indicated locations within the GCFRP accounting area where they are interested in operating and expressed their commitment to leveraging of resources and creation of synergies for optimizing achievement of results.

The Joint Coordinating Committee (JCC) tasked with coordination of the ERP, made up of officials of the Forestry Commission and the Cocoa Board, have begun the process of engaging with these PS actors to define clear roles and terms of engagement as part of steps to firm up arrangements for the smooth take-off of implementation of the ERP.

The process builds on the issues raised during stakeholder consultations to ensure the appropriate streamlining and fine tuning of the program. For example, it was at such a stakeholder consultation that wildfire was agreed to be added to the key drivers of deforestation after rigorous discussions on land cover maps during a Strategy Multi-Stakeholder Consultation Workshop. As a result of this process, which has taken place in an open and positive light, significant goodwill and trust has been established and reinforced, and actors and partners are showing broad based support for the GCFRP, as evidenced by their desire and commitment to participate in the HIA selection process.

Figure 6 (below) lists the main institutions, entities, and representatives that have participated in the consultation process. Consultations and engagements that have been planned for the coming months are listed in Table 7.

Government	<ul style="list-style-type: none"> •MLNR, MESTI, MOFA, MoF, FC (WD, FSD, TIDD,CCU), COCOBOD (CHED, RM&E), EPA, Energy Commission, NADMO, District Assembly DCEs, Parliamentarians.
Private Sector	<ul style="list-style-type: none"> •Touton, Armajaro, Olam, Portal Forest Estate, Hamilton Resources and Consulting, Cocoa Processing Company Ltd, Kuman Koman Company, BD Associates Cocoa Merchants Ghana Ltd, Barry Callebant Co. Ltd, First Sky, Unicom Co. Ghana Ltd, Cargill Ghana Ltd, Koapa Kokoo Ltd, Produce Buying Co. Ltd, Nyonkopa Cocoa Buying Ltd, Federated Commodities, Ismeal Yamson and Associates, Mondelez Int Cocoa Life.
NGOs	<ul style="list-style-type: none"> •Solidaridad, Rainforest Alliance, NCRC, IUCN-Gh, A Rocha Ghana, Tropenbos, Civic Respose, Conservation Alliance, KASA, SNV, Agro Eco, Ghana Integrity Initiative, CAN Ghana, Rise Ghana, Colandef,
Traditional Leaders & Community Reps	<ul style="list-style-type: none"> •National House of Chiefs, Forest Forum, Cocoa Farmers from Eastern Region, Central Regoin, BA Region, Western Region, Students
Research Institutions	<ul style="list-style-type: none"> •FORIG, CRIG, CERGIS, KNUST
Donors	<ul style="list-style-type: none"> •WB, UNDP, Norway

Figure 6: Institutions, companies and organizations represented during ERPD stakeholder consultation.

Table 7: Planned upcoming stakeholder consultation meetings

Consultation/ Training/ Meeting	Description	Time Frame / Start Date
Initiate contracting process for benefit sharing plan design	To be commissioned by NRS, a BSP will be designed through a consultative, multi-tiered process.	October, 2016
Tree Tenure	Discussion with FIP Team on how to pilot tree tenure reforms.	Oct, 2016
Meeting with FIP on alignment of FIP and GCFRP activities	Meeting with FIP Team on moves to align FIP PIM and GCFRP implementation activities.	October, 2016
Chocolate and Cocoa commodity companies	Participation at World Cocoa Foundation meeting in Abidjan	October, 2016
Begin investment phase	Contract consultants to negotiate investment and engagement agreements with select companies for HIAs	November, 2016
2016 National REDD+ Forum	Annual national REDD+ forum for all stakeholders. Launch of National REDD+ Strategy and presentation of ERPD	November, 2016

5.2 Summary of the comments received and how these views have been taken into account in the design and implementation of the ER Program

Please provide a summary of the comments received from stakeholders including the main topic, the type of stakeholder and a concise description of the comments (detailed minutes of meetings can be annexed or referenced if publicly available). Describe how these views have been, or will be taken into account in the design and implementation of the ER Programme to ensure broad community support

Since February, 2015, the NRS and its partners have held over 13 large scale meetings, workshops, trainings, plus more than 20 additional meetings and information sessions with the aim of sharing information about the program, gaining input and feedback to improve the concept and design, and building capacity and understanding. Through these events many important comments have been received from stakeholders, which have been considered and taken into account in the process of designing the ERP. Table 7, summarizes the main REDD+ consultations that have taken place, with as many details as possible on the purpose of the event, participants, questions, answers and lessons learned. The rest of this section provides a brief summary (paraphrasing) of the main questions and issues that have been raised over the course of this process and how these comments have been responded to or reflected in the design process. Annex 5 provides a detailed description of the major events, participants, methods, feedback and lessons.

Table 8: Summary of questions, comments, responses and feedback from stakeholder consultation

Event	Comments / Issues/Question	Responses
<i>ERP Information Sharing and Kick-Off for High Level Stakeholders, March 4th, 2015, Fiesta Royale Hotel, Accra.</i>	Why so much overlap between the FIP and the ERP? How are these programs working together and how are they different?	The FIP area falls within the ERP area and share the same objectives. The two program areas are characterised by the same drivers of deforestation and forest degradation. There are to synchronize work plan of the two programs to avoid duplication of efforts. While the ERP is a performance based payment, the FIP is not. Rather, FIP sought to pilot readiness activities that would later be up- scaled to put Ghana in a position for implementation of performance based payment ER Program.
<i>Synergy between REDD+ and FLEGT/VPA with respect to Benefit Sharing, Legality and Safeguards, March 13th, 2015, Forestry Commission Auditorium, Accra.</i>	Is there a way of institutionalizing coordination and capturing synergies between REDD+ and VPA with respect to benefit sharing, conflict resolution, and complaint mechanisms?	The GCFP and REDD+ in general are synergistic with a number of other key initiatives like the VPA, FIP, etc. The JCC and the various sub-working groups represent efforts to ensure that there is serious institutional collaboration and coordination. For instance, on the NRWG and the Consultation and participation sub-working groups, there are representatives from FLEGT/VPA serving. In the same manner, the Head of the NRS also serve on the VPA Multi-stakeholder implementation Committee.
<i>Consultation with stakeholders implementing REDD+ activities across the country—REDD+ Finance Tracking Initiatives (REDDX), 23rd June, 2015, FC Auditorium, Accra.</i>	How is the program addressing tree tenure?	It is apparent that planted trees on-farms are owned by the planter.
	How is it aiming to motivate farmers to plant trees and how will farmers stand to benefit?	Under FIP tree seedlings are being distributed freely to farmers, and education and sensitization on the non-carbon benefits including provision of micro climate, soil conservation and fertility improvement of trees on farm are being undertaken.
	How will ERP program engage all stakeholders, not just at high levels but also at the district and local level where the deforestation is taking place?	The program will have specific HIAs and in each intervention area there will be HIA consortium which will have a constitution, Management plan and district bye laws and the intervention area management board. The management board will be made up of the traditional authorities, village committees etc. There is already ERP stakeholder consultation plan.
<i>Training for Staff of Ghana's COCOBOD and FC on the GCFP, Sept 21-24, Aqua Safari, Ada, Ghana</i>	How would the sustainability of the ER program be guarantee	Non-carbon benefits are likely to be the most sustainable and important to farmers. The non-carbon benefit of E such increased yields, access to farming inputs, and rights to trees will drive the sustainability of the program.
	How will the benefits sharing mechanism and/or bonus payment system under the COCOBOD inform the design of the Ghana's ERP benefit sharing mechanism?	This viewpoint, which was widely shared by COCOBOD participants, aligns with the logic of Ghana's ERP and has informed the design of the program's benefit sharing mechanism.
<i>Community Consultation on Ghana's ERP, Owuram (Asamankese), Eastern Region,</i>	What existing measures are in place particularly on safeguards and for which lessons or experiences could be learnt to enhance the implementation of the ERP.	COCOBOD has extensive experience dealing with safeguard issues in its sector (e.g. child labor), as well as benefit sharing (bonuses). The Research, M&E Department of COCOBOD has the responsibility to monitor safeguard results and the staff on the ground are required to report as part of their results framework how safeguards issues are addressed. Again, CHED has developed best practices guideline for cocoa production. Lessons learnt are being incorporated into the design of ERP.
	How will the GCFP change the BAU on the ground with respect to contractors felling trees without farmers' consent	The ERP through stakeholder consultation at various levels including local communities has been sensitizing people particularly farmers on the legality of ownership of planted trees as well as the conditions under which contractors could fell trees on farms. The ERP learnt lessons from the free

<i>October 9th ; and Assin Fosu, Central Region, October 13th, 2015.</i>	and not paying compensation, and farmers' inadequate access to seedlings and fertilizer? The situation is not good for farmers.	distribution of tree seedling and improved access to some farming inputs
	Gender considerations in REDD+ and the program should be stronger and clearer. How is gender being considered in REDD+ and in the design of the ERP?	Gender considerations are being given careful attention in the design of the ER Program. Under the readiness phase of REDD+, the Forestry Commission in collaboration with IUCN engaged several stakeholders towards ensuring that gender issues are mainstream in the design and implementation of any REDD+ program. The product of that collaboration in the design of a gender Road Map for REDD+ in Ghana. The roadmap guided gender considerations in the development of REDD+ Strategy.
<i>REDD+ Strategy Multi-Stakeholder Consultation Workshop, Nov 5th, FC Auditorium, Accra</i>	How will the program address the lack of compliance with and enforcement of timber harvesting rules and regulations?	The program implementation will support national efforts towards passage of legislation, reform and implementation of government policies, modification to customary norms and practices
	The strategy should clearly indicate how to address land tenure issues, tree tenure issues and carbon right as they emerge.	
	Wildfire should be part of the drivers especially considering the savannah ecological zone. The diagram showing drivers of deforestation and degradation needs to be expanded to cover other drivers aside from the five mentioned.	
	On financing, focus has been on the international market, but we should also look at the local market for financing for example Agricultural Development Bank and some internally generated system to support the implementation of the program under the strategy.	
<i>IUCN BMU REDD+ Benefit Sharing Project Learning Event, 9th - 11th November, 2015 at Aqua Safari Resort, Ada</i>	Although individual landowners and land users do not have economic rights to naturally occurring trees, they do have the right to fell trees off-reserve during the land-clearing process and frequently nurture or eliminate species based upon their farming agenda and experiences. How will the program address this problem?	
	The current tree tenure system where the State owns all naturally-occurring trees and farmers have no ownership right over such economic trees in their farms, creates a disincentive for farmers to keep naturally economic trees in cocoa farms. How will the program address this problem	The ER Program is transformational and therefore seek to push for significant changes and reforms in the forestry sector policies and strategies which include issues of tree tenure.
<i>SNV Knowledge Event on Ecosystem Services in Ghana's Cocoa Landscape, 12 November, 2015 Mensvic Hotel, East Legon Accra, Ghana.</i>	Landscape has low carbon stocks, hence, it has the high potential for accumulating carbon with the implementation of REDD+; Non-timber species are more dominant in the landscape; more trees do not necessarily translate into greater canopy cover as it is dependent on species and tree characteristics; Shade tree canopy coupled with modest fertilizer application can have a positive impact on yields under low input smallholder cocoa cultivation.	
<i>The National REDD+ Strategy (NRS) Validation workshop 17th December, 2015 at the FC Auditorium, Accra.</i>	How does the program/strategy sought to address the challenge of land use planning; what are domestic sources of funds - the document did not stress on domestic financing;	The program will promote local level institutional coordination, stakeholder consultation and involvement in sub-national level land use planning. The development of an ER implementation plan which a consulting firm will be contracted to design will outline the various possible or funding or financing sources for implementing the ER Program and for that matter any the REDD+ program for Ghana.

	The document lacks strategic components such as setting ambitious carbon targets for the identified drivers of deforestation and forest degradation.	MRV has not been verified so setting our own targets will be difficult at this stage; Specific carbon targets cannot be provided now to due limitation in MRV - Implementation plan will provide specific details on carbon targets;
	Scope of REDD+ does not give much information on how biodiversity will be monitored. How is the issue of biodiversity conservation being addressed	We need to clearly define land use systems and land tenure in our Safeguards Information Systems
	How is cocoa strategy align with REDD+ strategy - there should be a close linkage.	The basic reason for the establishment and inauguration of the JCC between the FC and the COCOBOD is the general understanding that sustainability of cocoa production hinges on the sustainable management of forest. The Ghana National Cocoa Strategy II is at the draft stage of development. The strategy focus on climate smart cocoa production and sought to ensure combinations of cocoa trees and shade crops/trees that have both economic and environmental benefits. In fact, the cocoa strategy mention the collaboration between FC and COCOBOD in the ER Program and the FIP as current sustainability programs.
<i>Youth Event - REDD EYE CAMPAIGN</i>	How does Trees help to fight climate change? How do we benefit from not cutting trees for charcoal and export?	As trees grow, they help stop climate change by removing carbon dioxide from the air, storing carbon in the trees and soil, and releasing oxygen into the atmosphere; Trees can be cut for charcoal and export but it must done within the law and new seedlings must be planted to substitute the old ones.
<i>Multi-Stakeholder Project Inception Workshop: Operationalizing National Safeguards Requirement for Result Based Payment From REDD+. 10th March, 2016 at the Tulip in Hotel, Accra.</i>	How will REDD+ safeguard for Ghana maintain biodiversity and ecosystem service?	
<i>Capacity Enhancement on Forest Reference Level/Masurement, Reporting and Verification System for REDD+ (MRV Training) 4th – 15th April, 2016 at the Forestry Commission Training Centre, Kumasi.</i>	How are errors taken into consideration for projections of emissions and removals?	Activity data of specific statistics through sampling often has an error factor with it. Provisions of UNFCCC and FCPF give room for some errors based on the requirements of the organization you are submitting to. Data sampling and maps gives room to report on uncertainty of emissions reduction specific uncertainty for each deforestation strata.
	What stratification of forest is used for Ghana and how are capacities of local experts being built for MRV?	For stratification of the forest, it is important that the strata needs to be identifiable/verifiable using remote sensing/ satellite imagery. Strata could include; accessibility, openness of forest, vegetation area, terrain. Team of experts from Winrock and Applied Geo-Solutions to train specific institutions/individuals who will be involved in the MRV. Knowledge sharing on delineation of cocoa from forests
	Is Ghana reporting on Tier 1, 2 or 3 data for the reference level taking into	FPP is under Tier 2 because we have country specific data on above-ground biomass, below-ground biomass, litter and deadwood. However, soil data is not very easy to fall under Tier 2 because it should

	<p>consideration Forest Preservation Programme?</p> <p>Any difference between Tier 2 and Tier 3?</p>	<p>look at change in stock rather the available stock Ghana has. In this case Ghana can use Tier 1 for soil.</p> <p>Tier 3 allows negotiating at different levels using models as informative tool rather than just activity data. Indonesia and Kenya are the REDD+ countries using Tier 3 supported by Australia. Canada has Tier 3 and supporting Mexico.</p> <p>A country can still use national datasets to achieve Tier 3 but will use these repetitive data to as well as remote sensing for modelling. However this setup is very costly and is a decision of the country to see if it's imperative to use Tier 3</p>
<p><i>Implementation Plan Consultation with Cocoa Private Sector Stakeholders at Accra City, 6th June, 2016.</i></p>	<p>We always talk about over 2million, CHED is also talking about 1.7million. Which one should we reference?</p>	<p>In order to achieve the objective the ERP will be implemented wall to wall, thus across the entire landscape. But, of course activities will not be implemented at the same scale across the entire landscape at the same time. There is the need to start from priority areas and later scale up to cover the entire landscape.</p>
	<p>There is high deforestation identified particularly along the middle vertical stretch of the program area, and this could be attributed to galamsey. Why were these areas left out in the selection of the HIAs?</p>	<p>The issue of mining and illegal mining has become a national security issue. The ERP resources could not be used to solve national security problem. It is therefore advisable to start with areas that do not have much gold deposit and therefore free from issues associated with mining.</p>
	<p>Is there significant location they are going to move to when the resource get exhausted at their current deposit site.</p>	<p>We will have to hear from some other state agencies on what government is doing to resolve the problems and also ensure that such activities are not moved into other areas within the landscape.</p>
	<p>Concerning the premium price of the commodity – who pays the difference in the price</p> <p>Who will be responsible for paying the differential premium</p>	<p>It is the consumer who will be responsible for paying the differential premium. This is because the principle is to internalize the externality.</p> <p>There has to be a Ghana cocoa</p> <p>It is not a premium but a different commodity</p>
	<p>The role of the traditional authorities, district assemblies. The byelaw made at local levels are more adhere to than the national laws. If the traditional authorities and local people understand the importance of the program.</p>	<p>At the HIA levels there will be landscape and land use planning will be undertaken and at that level all these stakeholders will be brought together to discuss issues amicably and find solution to addressing them.</p> <p>Reference to the HIA Consortium min the implementation plan</p>
<p><i>Multi Stakeholder Workshop on Ghana Cocoa Forest REDD+ Emission Reduction Program – Draft Implementation Plan. 14th June 2016 at the</i></p>	<p>We always talk about further assessment and analysis of data</p> <p>What happened to the FPP data – is not useful?</p> <p>There are lots of other things going</p>	<p>The FPP data were used by the consultant in this assignment. However, there were some constrains. For instance, FPP data used only up to 2010. There is therefore the need for some additional analysis in order to fill some gaps in available data.</p> <p>HIA is the cocoa farmer – initial the stakeholder analysis under this assignment focused on</p>

<i>Auditorium of the Forestry Commission</i>	on in the landscape apart from cocoa as well as very important stakeholders like traditional authority and farmers. How are they being consulted and involved?	who has the money to invest in the program to achieve the desired result. Going forward with implementation, there will further stakeholder mapping and analysis in each HIAs. The HIAs are going to have their own consortium and will have to work on all other things including which stakeholders should be involved in the implementation of the program to be involved. For instance, apart from political commitment at the highest level, we are also looking at political commitment at the local level where the traditional authorities are in charge.
	The cocoa sector is a 2billion dollar investment sector. The question therefore is how we leverage on the cocoa sector investment in the landscape to achieve the emission reduction.	Since HIA were determined based on cocoa sector stakeholders, is it not possible to miss other important non-cocoa sector stakeholders who are also working in the landscape and whose activities could impact the program positively or negatively?
	Public and private funding in the program area. Mobilizing public finance for initiative like this has always been very challenging. What is the potential source of funding for the program?	The potential source of funding will be the private sector and that will be cocoa money. Private cocoa companies have their sustainability programs and these programs are not helping our forest.
	How best will HIAs be integrated into the District Assembly system so that it will benefit from the district in term of district planning	The HIA is a landscape and the consortium that will include all stakeholders (public private NGO CSO etc.) and with this it can then be integrated into the District assembly development plan. The program has to be sustainable and cocoa alone cannot make it sustainable and this is why the role of other stakeholders including the district assembly will be very important in ensuring the sustainability of the program.
<i>Consultation with Key Policy Makers held on 7th July, 2016.</i>	to be added	to be added
<i>Consultation with the Parliamentary Select Committee on Lands and Forestry on Ghana's ER Program held on 21st July, 2016 at Villa Victoria</i>	Was it a policy directive that Pamu Berekum forest reserve should be cleared? What is FC doing to address the problem? Are there sensitization in the area to educate the people on the effects of forest lost?	FC has been implementing diverse programs including high forest biodiversity, FIP and NREG-TA are undertaking restoration activities within depleted forest reserve etc. Steps taking to recover forest loss at the Pamu Berekum forest reserve includes sustainable forest plantation programme and education and sensitization of the public on the adverse effects of climate change.
	To what extent is the programme attracting private sector investment?	The GCFRP is designed in such a way to leverage on the support from the private sector in implementing the programme.
	who ensures that the lands are	Mining has highlighted in the REDD+ Strategy document, but FC and its stakeholders cannot

	reclaimed after mining?)	solve the issue of mining alone. It needs a strong political commitment and cooperation between stakeholders in the mining sector.
<i>Consultation with Metropolitan, Municipal and District Assemblies (MMDA's) on Ghana's ER Program held in Takoradi on 16th and in Kumasi on 18th August 2016.</i>	Why is the ERP focusing on agriculture, specifically cocoa? Why is the Volta region not included in the GCFRP as cocoa is also grown there?	There is a special reason why cocoa is the focus. The ERP is targeting the cocoa forest mosaic landscape within the High Forest Zone of Ghana as the initial step. Agricultural expansion (conversion of forest to cocoa) is a major driver of carbon emission within that landscape. There are other ERP being designed for the Savanna, Coastal and Togo Plateau (which will cover the Volta Region).
	How can the ERP contribute to law enforcement as Ghana has a lot of laws but enforcing the laws has always been a major problem?	Law enforcement has been a problem for all institutions. There are problems with personnel especially as most forest guards are over-aged or not motivated to perform their mandate to the fullest. We need collective effort in this regard to enable Ghana realize the goal of the ERP and REDD+.
	How can the program provide community members with alternative livelihood schemes other than forest products?	Alternative livelihood is a very important initiative; there is a need to effectively implement and monitor it. Most MMDA's present reiterated the fact that the program must focus on providing alternative livelihood schemes for natives to concentrate on other income generating avenues rather than on forests to avoid further degradation
<i>Consultation with Traditional Authorities on Ghana's ER Program Held in Kumasi on 23rd August 2016.</i>	How will REDD+ contribute to Legislation?	Issue of legislation is a major driver and a high priority activity. Law enforcement has been a major problem in Ghana for several years. Over the years chiefs have been able to enforce local laws in their communities and impose sanctions which have worked effectively. Capacity building programmes have been organized for frontline staff of the FC in all 10 regions. The training is a continuous process. Through REDD+ and support from traditional authorities and other stakeholders the FC is poised to effectively engage in emission reduction programmes.
	How can traditional authorities contribute to sensitization?	Chiefs could use the opportunity during festivals or durbars when engaging with communities to sensitize communities. Also the NRS is willing to attend program or durbars upon invitation from chiefs to talk about the program. The GCFRP is committed to supporting traditional authorities in terms of sensitization and high level advocacy on the program.
	What has COCOBOD done in reducing emissions and contributing to the ERP?	COCOBOD has engaged with farmers in capacity building programmes by using community extension agents. Staff of COCOBOD have also been trained on the ERP and REDD+ and staff of FC and COCOBOD work together to help reduce emissions.

6. OPERATIONAL AND FINANCIAL PLANNING

6.1 Institutional and implementation arrangements

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Please describe the institutional and implementation arrangements for the day-to-day operations of the ER Programme. Describe how the ER Programme Participants and other involved entities have sufficient capacity to undertake the proposed ER Programme operations and to implement ER Programme measures, including but not limited to: i) administrative oversight of the ER programme; ii) development and operation of the Reference Level and Forest Monitoring System; iii) financial management; iv) Implementation of Benefit Sharing Plan and relevant Safeguard Plan(s); v) feedback and grievance redress mechanism(s); vi) stakeholder consultations and information sharing; vii) implementation of ER Programme measures. Describe how the implementation arrangements for the ER Programme are linked to any national REDD implementation framework

*Refer to **indicator 27.2** of the Methodological Framework*

The institutional and implementation arrangements for the day to day operations of the GCFRP, as well as the broader support under REDD+ to the programme are shown in Figure 7. Starting from the high level institutional support and working down to the programmatic institutions and stakeholder bodies, this section describes the main roles and responsibilities of the institutions affiliated with the programme.

The NRWG is a ministerial level, multi-stakeholder body charged to provide oversight and guides to REDD+ nationally, as fully described in Section 2.3. In line with the national REDD+ implementation architecture, the NRWG will have indirect, high level oversight of the programme. Specific to the programme, the GCFRP Steering Committee includes the Director of the REAL Sector of the MoF, the Chief Executive of the FC, the Chief Executive Officer of the Cocoa Board, and the Chief Director of the MLNR. This Ministerial level body ensures the highest level of institutional oversight, guidance, and support to the programme. Members of the NRS and the JCC communicate with and report to the Steering Committee.

As described in Section 2.3, the NRS has full administrative and management responsibility for REDD+ nationally. It receives guidance and direction from the NRWG and communicates to the programme's Steering Committee, and other future programme steering committees, while working in close collaboration with the GCFRP JCC.

At the programme level, overall management and coordination is the responsibility of Joint Coordinating Committee (JCC). The JCC is a six person committee that was established in 2015 to support the development of GCFRP, to ensure efficient communication and coordination between the NRS, Cocoa Board, the FIP, and the NRWG, and to serve as a body to coordinate and guide high level implementation. The JCC is made up of two representatives from the NRS, two representative from the FIP (one from FC and one from the MLNR), and two representatives from the Ghana Cocoa Board.

The JCC's role as a cross-sector oversight committee will primarily be to guide and direct the PMU, but will also be linked to the roles of other bodies, partners and stakeholders. To ensure transparency and effectiveness, the roles and responsibilities will be made clear to all stakeholders and partners at the onset of GCFRP implementation. It is envisioned that on an annual basis (or otherwise), the JCC will be responsible to set targets for GCFRP implementation and to approve the annual planning of GCFRP implementation as drafted by the Programme Management Unit and the

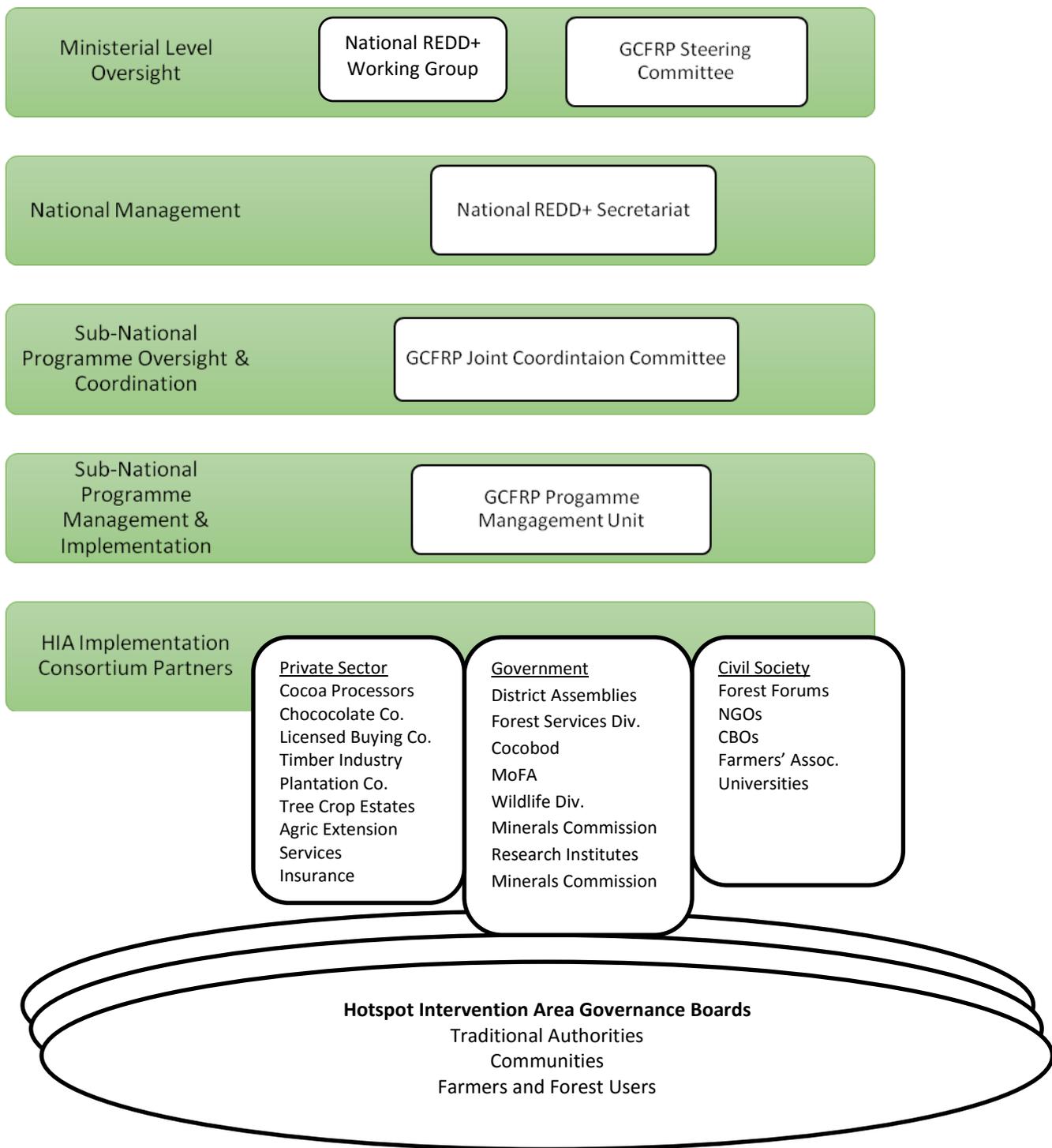
HIA consortiums. The JCC will maintain financial oversight of the programme. Further, the JCC will need to secure and maintain high-level government endorsement for the GCFRP and coordinate inter-governmental collaboration and communication.

The Programme Management Unit (PMU) will be the executive agency for the GCFRP. It will be composed of representatives of the MLNR, MoF, FC, Minerals Commission (MC), COCOBOD, District Assemblies and relevant NGOs, companies and other stakeholders directly involved with the implementation of the programme's measures and activities, including stakeholder engagement and consultation. The PMU will also have technical staff responsible for key elements of the programme, including the implementation of the benefit sharing plan and safeguards, and the feedback and grievance redress mechanism. Further, the PMU will be responsible to develop an annual operational plan (AOP), annual budget, and implementation reports about the GCFRP, which will be shared with the JCC for input. The PMU will then be responsible for implementing the AOP. As part of this, The PMU should also promote partnerships among local stakeholders and other agencies and execute contracts and agreements to guarantee the implementation of the Programme, and coordinate and promote the attraction of investors and new potential sources of funds for CSC and REDD+ in the GCFRP region.

With respect to the implementation and updating of the MRV and FREL, and the operation of the data management system, responsibility will fall under the NFMS, which sits within the FC's RMSC and reports to the NRS. These two bodies are responsible for these activities at both national and programme(s) level. Therefore, someone from the NFMS will sit within the PMU so that the two bodies are able to work in synch. In this regard, the PMU will be responsible to support the NFMS in coordinating the accounting and monitoring procedures to clearly demonstrate the performance of the GCFRP against its FREL, annual monitoring and oversight of impacts and changing trends, and maintain the data management systems for housing key information related to REDD+ and CSC operation in the programme landscape. The PMU must also monitor and record the implementation status of activities in each Hotspot Intervention Area (HIA), and guarantee that the annual planning of activities is being followed and implemented.

While the PMU directs and coordinates implementation, the actual implementation of priority activities in each HIA will rely on a consortium of stakeholders (HIA Implementation Consortium Partners) who live, work, or have investments within the landscape, and have an interest in the area. As described in Section 6.1 (A5), each HIA landscape will be managed by an HIA Governance Body made up of local land-users, land owners and traditional authorities who organize themselves into a government recognized NRM structure, like that of the CREMA (i.e. modified CREMA), which accords them the right to manage their natural resources for their benefit.

The Consortium and the HIA Governance Body will establish how best to coordinate all activities related to the programme in their HIA's. The PMU and the HIA Consortium will carry on a participatory process to build the HIA governance and implementation structure at each location. Following successful negotiation of HIA initiation, the programme will support the requisite steps to establish management boards, prepare HIA constitutions, and hold regular HIA governance meetings. Key decisions of the HIA Governance Board will be to determine how best to make the transition to a climate-smart, no deforestation, sustainable cocoa production system in line with the development of a standard. Key activities will involve landscape planning, zoning land use practices, approving CSC practices to be adopted by farmers in the HIA, financial planning and management structures, and reaching agreements with the HIA CSC Consortium. Appropriate levels of communications with all stakeholders will be achieved through durbars, local FM radio announcements and other media.



- Bodies in direct alignment with the REDD+ that will provide critical support but not directly under the REDD+ Structure.
- REDD+ and GCFRP bodies responsible for guiding, managing and implementing REDD+ at national, sub-national, and landscape levels.

Figure 7: GCFRP Institutional Coordination Diagram

6.2 ER Program budget

Please use the table in Annex 1 to provide a budget for the ER Programme covering costs and revenues of setting up and operating the ER Programme until the end of 2020; and any budget available for proposed operations beyond the end date of the Carbon Fund ERPA. The budget should include cost estimates for measures and components of the ER Programme along with any revenue the ER Programme Measures may generate. The budget should include the different sources of funding, including payments from the Carbon Fund, other funders or buyers of ERs, grants, etc. that are available for the ER Programme.

In this section, identify any financial shortfalls and propose a strategy to address these funding gaps.

Funding for the implementation of the GCFRP will be from a mix of sources: REDD+ funds (10.8%), private sector investment (70.55%), Government of Ghana and Cocoa Board (15.3%), and donor grants (3.4%). In the current budget, the mix of funding sources is summarized in Table 9. Annex 2a and 2b and 3 provides a complete financial plan and budget for the GCFRP.

Ghana estimates that the total cost of setting up and operating the GCFRP over its first 5 years is US\$ 199,347,250. Of this, it is anticipated that the programme will generate approximately US\$ 47,982,250 in revenue from emission reductions. Assuming that Ghana signs an ERPA in 2017, this budget covers the period 2017- 2021.

Table 9: Summary of funding sources for the GCFRP

Summary of Funding Sources	Total	%
REDD+ Funding	\$ 21,582,250	10.8%
Private Sector	\$ 140,500,000	70.5%
Grants	\$ 6,710,000	3.4%
Government	\$ 30,555,000	15.3%
TOTAL	\$ 199,347,250	100%

REDD+ Funding

CF financing will contribute approximate US\$21.5 million to the programme, 10.8% of the total. Carbon Fund financing will be used primarily for Institutional Coordination, the MRV, and the establishment of the PMU. In addition, the development and implementation of the HIA Landscape Management Plans will be funded through CFF. Other interventions to be supported by REDD+ funds include increasing transparency in cocoa purchases, marketing of additional ERs, branding CSC, and developing a sustainable finance solution for the HIAs.

Private sector financing

The private sector and Cocoa Board investment of US\$140,500,000 represents just over 70% of the total value of the programme. In 2015, Ghana's entire cocoa sector was worth US\$ 1.8 billion, as evidenced by the syndicated loan that the Cocoa Board signed on behalf of the private sector in Paris in September. On top of this, the private sector makes additional investments through their public-private partnership extension programmes and sustainability initiatives, which are focused at the grassroots producers.

Therefore, the GCFRP does not expect the private sector to bring substantial *new* money, but rather it expects to leverage a portion of the existing investments and influence this investment into new and wise use. Specifically, the private sector will fund the major elements the programme, namely the establishment of CSC and the development and implementation of farmer engagement packages and better farming practice guides. In addition, the fund to support access to financial credit and providing access to yield insurance will be supported through private sector funds. Additional details will come following further discussions with the parties involved.

Grant Financing Sources

There are multiple potential grant sources of funding for this programme, and multiple work streams that could be packaged for such. In the current budget, grant funding will contribute approximate US\$6.71 million to the programme, or 3.4% of the total value. For example, NCRC/VCS/IKI will fund the entire budget for activity B4: Establish CSC landscape level validation in HIAs. In addition, item A4: Law Enforcement of the GCFRP, will be packaged for funding from a bi-lateral donor. Finally, Pillar E: Legislative and Policy Reform, will be packaged for funding through the Forestry Investment Programme (FIP) of the World Bank’s Climate Investment Fund.

Potential sources of grant funding include: Solidaridad, SNV, IUCN Netherlands Committee, NCRC/ Forest Trends and the 25 million Sterling DFID/Palladium fund to support climate smart agriculture that contributes to emissions reductions.

Government Financing Sources

In the current budget, government funding will contribute approximately US\$30,555,000 to the programme, or 15.3% of the total. Government will fund the establishment of the Joint Coordinating Committee and the Steering Committee. In addition, Cocoa Board input supply is expected to represent 25% of the CSC package for beneficiary farmers. This represents the majority of government contribution, valued at approximately US\$30,000,000.

Costs related to the Implementation of the Benefit Sharing Plan will be added once the plan is designed and validated. The costs of implementing the FGRM and stakeholder consultations and information sharing are under discussion and will be added to the next draft of this document.

Table 10: Summary of budget categories

Budget Category	Total	%
A. Institutional Coordination and MRV	\$ 9,625,850	4.8%
B. Landscape Planning within HIA areas	\$ 16,466,400	8.3%
C. Increasing Yields via CSC	\$ 120,580,000	60.7%
D. Risk management/finance	\$ 51,930,000	26.1%
E. Legislative and Policy Reform	\$ 745,000	0.4%
TOTAL	\$ 199,347,250	100%

Budget Category Summary and Discounted Cash Flow Analysis

Approximately 86.8% of the total programme budget is dedicated to support to farmers through the CSC packages to farmers focused on increasing yields, as well as the financing small scale loans to farmers to implement improved management practices.

An initial discounted cash flow analysis of the CSC opportunity shows that the GCFRP makes excellent financial sense in addition to climate sense. A conservative doubling of yield on cocoa farms to 800 kg/ha (even greater increases are possible and have been demonstrated) will realize significant benefits to farmers and to the government. The IRR for the project under this scenario is calculated at over 2,200% and the NPV at 10% will be \$1.96 billion.

The full discounted cash analysis is presented in Annex 2C with scenarios of no increased yield, 50% increase, 100% increase, 150% increase and 200% increase in yields. All scenarios are attractive, with the exception of no increased yield, demonstrates that focusing on increasing cocoa farm yields through the establishment of a CSC Sustainability Standard, can produce major socio-economic benefits, in addition to carbon benefits.

A brief description of each budget category is below, and Annex 2B includes a table with budget notes.

Institutional Coordination and MRV

At US\$9,625,850, this budget category represents 4.8% of the total budget. This activity area includes funding the Joint Operating Committee (US\$555,000) and establishing the Programme Management Unit (US\$3,525,000). In addition, this budget category includes funding for the MRV (US\$500,000), Law Enforcement of the GFCP area (US\$4,100,000) and the creation of the CSC hotspot areas (US\$945,000).

Landscape Planning within HIA area

Landscape planning represents 8.3% of the total budget, or approximately (US\$16,466,400). This budget category includes funds for establishing the CSC consortium in each HIA (US\$120,000). In addition, this category includes the creation of the HIA landscape management plans (US\$1,608,000) and the implementation of the management plans (US\$13,638,400). Finally, this category includes landscape level validation in the HIAs (\$1,100,000).

Increasing Yields via CSC

Increasing yields via the CSC represents 60.7% of the total program budget at (US\$120,580,000). The majority of this category is the CSC support to farmers, estimated at \$24,000,000/year over 5 years supported both through private sector funds and input support from Cocoa Board. Other activities supported in this budget category include development of the CSC packages to farmers (US\$150,000), development of CSC good practice guidelines (US\$180,000) and support to increase transparency in the cocoa sector (US\$250,000).

Risk Management/Finance

This budget category represents 26.1% of the total programme budget at (US\$51,930,000). The majority of this budget category is dedicated to the creation of a credit facility to provide small scale loans to cocoa farmers (US\$50,050,000). Other activities supported in this budget category include facilitating access to yield Insurance (US\$20,000), marketing of addition emissions reductions (US\$160,000), branding and marketing of ER Cocoa (US\$290,000) and supporting the sustainable finance of the HIAs (US\$1,230).

Legislative and Policy Support

This budget category represents 0.4% of the total programme budget at \$745,000. Key activities supported in this budget category include support to key legislation (US\$220,000), Reform and

implementation guidance of government policies (US\$270,000) and support for the modification of customary norms and practices (US\$255,000)

7. CARBON POOLS, SOURCES AND SINKS

7.1 Description of Sources and Sinks selected

Table 11: Description of sources and sinks

Sources/Sinks	Included?	Justification / Explanation
Emissions from deforestation	Yes	The ER Programme will account for emissions from deforestation.
Emissions from forest degradation	Yes	The ER programme will account for emission from four sources of forest degradation: -Woodfuel collection -Forest fire -Legal timber logging -Illegal timber logging
Removals from carbon stock enhancements	Yes	The ER programme will account for removals from forest plantations that have been planted on “on-reserve” lands. “Off-reserve” forest plantations were not included due to a lack of historical activity data.

7.2 Description of Carbon Pools and greenhouse gases selected

Table 12a-12e: Carbon pools and greenhouse gases

12a Deforestation

Carbon Pools	Selected?	Justification / Explanation
Aboveground Biomass	Yes	The aboveground biomass pool is the most significant pool for forests in Ghana.
Belowground Biomass	Yes	The belowground biomass pool is a significant pool.
Litter	Yes	For completeness, litter is included
Deadwood	Yes	For completeness, deadwood is included
Herbaceous	Yes	For completeness, herbaceous is included
Soil	Yes	The soil carbon pool is a significant pool.

Greenhouse gases	Selected?	Justification / Explanation
CO ₂	Yes	The ER Programme shall always account for CO ₂ emissions and removals
CH ₄	Yes	Methane emissions may be significant if fire used to deforest
N ₂ O	Yes	Nitrous oxide emissions may be significant if fire used to deforest

12b Degradation by Logging (legal and illegal)

Carbon Pools	Selected?	Justification / Explanation
Aboveground Biomass	Yes	The aboveground biomass pool is the most significant pool for this activity in Ghana.
Belowground Biomass	Yes	The belowground biomass pool is a significant pool.
Litter	No	The litter pool is not a significant source of emissions for this activity
Deadwood	Yes	The deadwood pool is a significant pool
Harvested Wood Products	Yes	The harvested wood product pool is significant. A committed emissions approach is taken and so the permanently sequestered stock in harvested wood products is very small.
Soil	No	The soil carbon pool is not a significant source for this activity

Greenhouse gases	Selected?	Justification / Explanation
CO ₂	Yes	The ER Programme shall always account for CO ₂ emissions and removals
CH ₄	No	Methane emissions are not a significant source for this activity
N ₂ O	No	Nitrous oxide emissions are not a significant source for this activity

12c Degradation by Woodfuel Collection

Carbon Pools	Selected?	Justification / Explanation
Aboveground Biomass	Yes	The aboveground biomass pool is the most significant pool for this activity in Ghana.
Belowground Biomass	Yes	The belowground biomass pool is a significant pool for this activity in Ghana.
Litter	No	The litter pool is not a significant source of emissions for this activity
Deadwood	No	The deadwood pool is not a significant source of emissions for this activity
Soil	No	The soil carbon pool is not a significant source for this activity

Greenhouse gases	Selected?	Justification / Explanation
CO ₂	Yes	The ER Programme shall always account for CO ₂ emissions and removals
CH ₄	No	Methane emissions are not a significant source for this activity
N ₂ O	No	Nitrous oxide emissions are not a significant source for this activity

12d Degradation by Fire

Carbon Pools	Selected?	Justification / Explanation
Aboveground Biomass	Yes	The aboveground biomass pool is the most significant pool for this activity in Ghana.
Belowground Biomass	Yes	The belowground biomass pool is always a significant pool.
Litter	Yes	Not significant, included for completeness
Deadwood	Yes	Not significant, included for completeness
Soil	No	The soil carbon pool is not a significant source for this activity

Greenhouse gases	Selected?	Justification / Explanation
CO ₂	Yes	The ER Programme shall always account for CO ₂ emissions and removals
CH ₄	Yes	Methane emissions may be significant source for this activity
N ₂ O	Yes	Nitrous oxide emissions may be a significant source for this activity

12e Removals by Carbon Stock Enhancements

Carbon Pools	Selected?	Justification / Explanation
Aboveground Biomass	Yes	The aboveground biomass pool is the most significant pool for this activity in Ghana.
Belowground Biomass	Yes	The belowground biomass pool is always a significant pool.
Litter	No	The litter pool is not a significant source of emissions for this activity
Deadwood	No	The deadwood pool is not a significant source of emissions for this activity
Soil	No	The soil carbon pool is not a significant source for this activity

Greenhouse gases	Selected?	Justification / Explanation
CO ₂	Yes	The ER Programme shall always account for CO ₂ emissions and removals
CH ₄	No	Methane removals are not relevant in this activity
N ₂ O	No	Nitrous oxide removals are not relevant in this activity

8. REFERENCE LEVEL

8.1 Reference Period

Please provide the Reference Period used in the construction of the Reference Level by indicating the start-date and the end-date for the Reference Period. If these dates are different from the guidance provided in the FCPF Carbon Fund Methodological Framework, please provide justification for the alternatives date(s).

*Refer to **critterion 11** of the Methodological Framework*

The reference period for the construction of the reference level is from 2000-2015, and historical emissions will be estimated based on locally developed data and land cover maps.

Ghana previously requested an exemption from the Carbon Fund limitation of 2013 as the latest end date for a Reference Period (Criterion 11; Indicator 11.1). The explanation and justification for this exemption request is given in Annex 3. However, following the Carbon Fund meeting in June 2016, Indicator 11.1 has changed so that the end date must now be “two years before the TAP starts the independent assessment of the ER Programme Document”. Ghana’s reference period dates will be in compliance if the assessment were to begin on or after January 1st 2017. However, assuming that this assessment begins in August 2016, Ghana will be out of compliance by just three months. Ghana requests that this deviation be permitted.

8.2 Forest definition used in the construction of the Reference Level

Following Ghana’s National REDD+ Strategy⁴⁹, the definition used for Ghana’s ER-PD is a minimum of **15% canopy cover, minimum height of 5 meters, and minimum area of 1 hectare**, based on thresholds set by the IPCC for these structural parameters and the Marrakesh Accord. This definition is in line with the definition used in the most recent National Greenhouse Gas inventory.⁵⁰

Tree crops, including cocoa, citrus, oil palm (in smallholder or estate plantations), and rubber are not considered to be forest trees. Timber tree plantations are considered forest under the national forest definition.

⁴⁹ GoG, 2015. National REDD+ Strategy.

⁵⁰ Republic of Ghana, National Greenhouse Gas Inventory Report, July 2015. Table 72.

Agreement on this definition was reached following an intense consultative process in which three options were debated and discussed amongst a broad group of stakeholders. Consensus was reached on the definition stated above based on the strength of arguments adduced, however, it is important to note that not all participants in the process agreed with the outcome as they felt that the canopy cover and height parameters would exclude much of northern Ghana from participating in REDD+. It is noted that the UNFCCC will accept only a single forest definition for each country, and there is no option to provide different forest definitions for different ecological zones.

8.3 Average annual historical emissions over the Reference Period

Please provide a transparent, complete, consistent and accurate description of the approaches, methods, and assumptions used for calculating the average annual historical emissions over the Reference Period, including, an explanation how the most recent Intergovernmental Panel on Climate Change guidance and guidelines, have been applied as a basis for estimating forest-related greenhouse gas emissions by sources and removals by sinks.

*Refer to **criteria 5,6 and 13** of the Methodological Framework*

8.3.1 Description of method used for calculating the average annual historical emissions over the Reference Period

The development of the RL/REL and MRV is divided into steps based on the three key activity types (Figure 8). In addition, degradation is broken down further into four separate activities: degradation from legal timber harvest, degradation from illegal timber harvest, degradation from wood fuel collection, and degradation from fire. The section below provides details on the inputs used to develop historical emissions to support the establishment of the RL/REL, and the estimation of current emissions to support the establishment of an MRV system.

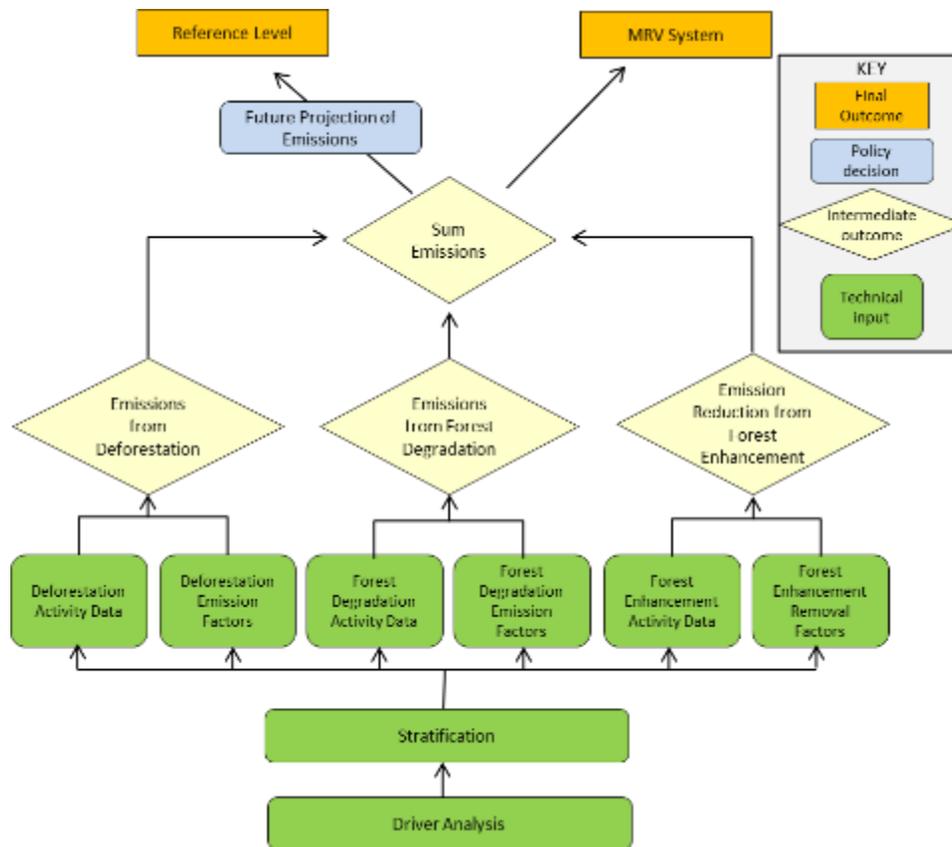


Figure 8: Framework for the National Forest Monitoring System to provide key input into the historical emissions for Reference Level Development and the Measuring, Reporting and Verification System.

8.3.2 Deforestation activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

Activity data

Activity data were obtained from the 2000, 2010, 2013 and 2015 land cover maps based on 30 m resolution Landsat data. The 2000 land cover map was used to establish the time-zero forest extent for Ghana that was then used to develop a forest “mask.” Losses in forestland cover, i.e. deforestation, were only counted if pixels classed as forest in the 2000 forest mask changed to non-forest in a subsequent land cover map. A separate study of plantations of agricultural tree crops was conducted using high-resolution imagery [methods in Annex 8], to allow removal of agricultural tree areas from deforestation totals and addition to the deforestation totals of areas where agricultural tree plantations replaced natural forest. This step was undertaken to ensure that plantations of agricultural tree crops were not accounted for in the Reference Level. Total deforestation was estimated as the sum of all the pixels in the 2000 forest mask that changed to non-forest between 2000, 2010, 2013 and 2015. The annual historical average was derived by dividing total deforested area (2000-2015) by the number of years (15):

$$\text{Annual average activity data} = \text{total deforestation} / \text{number of years}$$

Areas of deforestation caused by fire were identified using the MODIS burned area product, as discussed below in the degradation by fire section. Areas identified as burned and also as deforested were assumed to be deforested by fire.

Deforestation in the GCFRP area based on the four land cover maps is shown in Figure 9 below.

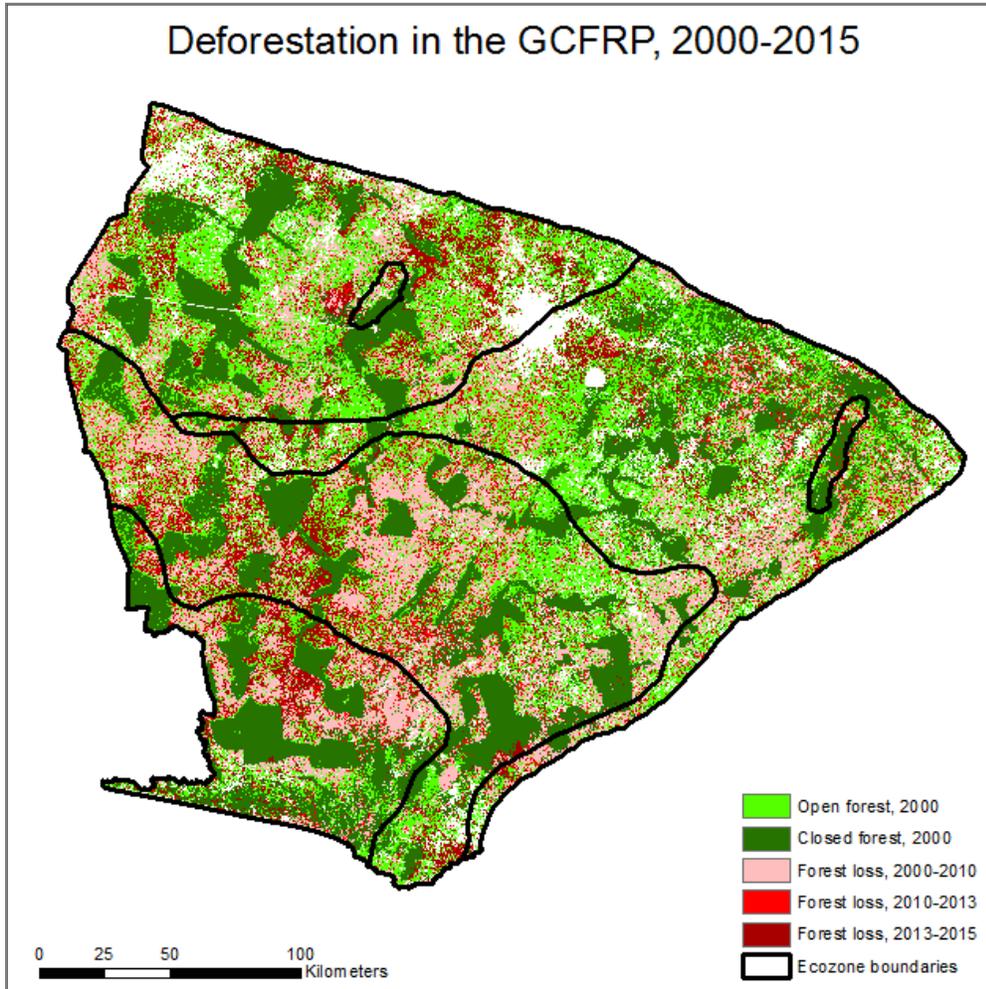


Figure 9: GCFRP Deforestation in 2000, 2010, 2013 and 2015

Table 13: Description of deforestation activity data

<p>Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):</p>	<p>Landsat imagery classified using NDVI. Forest cover change between 2000-2010-2013-2015. Stratified between “open” and “closed” forest, within five ecological zones (wet evergreen, moist evergreen, moist semi-deciduous SE, moist semi-deciduous NW, upland evergreen).</p>
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Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Deforestation
Data unit (e.g. ha/yr):	Average ha/yr
Value for the parameter:	138,368 ha/yr
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	Land cover maps developed by the Forest Preservation Programme (FPP) project for 2000 and 2010 ⁵¹ ; remote sensing analysis conducted by RMSC for 2013 and 2015, Applied Geo-Solutions (AGS) remote sensing analysis on differentiating natural forest from tree crops (see Annex 8.)
Spatial level (local, regional, national or international):	GCFRP Accounting Area ERP Accounting Area, which represents 5,926,206 ha
Discussion of key uncertainties for this parameter:	For the 2000 and 2010 images, accuracy assessment was completed on the 2010 land cover map using verification data from 2,213 field locations all across Ghana. Once the 2010 map was well established (as good an accuracy as could be produced within resource constraints) the same land cover classification methods were applied to 2000 land cover map. The 2012 and 2015 maps were produced replicating the same methodology, to the extent possible, that was used for the 2000 and 2010 maps. Key uncertainties include error in remote sensing classification due to haze, cloud cover, stripping from a Landsat 7 satellite malfunction, differences in seasonal greenness, and reflectance differences between Landsat images.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	2000/2010: The classification of forest to non-forest is 84% Accurate based on 2,213 field location across the country. No accuracy assessment has been conducted on the 2012/2015 maps, this will be included in the ER-PD during the review process when completed. At this point it is assumed that accuracy of these later maps is the same as for the 2000/2010 maps.

⁵¹ Forest Preservation Project. 2013. Report on Mapping of Forest Cover and Carbon Stock in Ghana. Executed by PASCO Corporation, Japan in collaboration with FC-RMSC, CSIR-FORIG and CIRT-SRI, Ghana

Reference data \ Classified data	Forest land	Cropland	Grassland	Settlements	Wetlands	Other land	Classified Total	Users Accuracy (%)
Forestland	520	48	39	0	0	0	607	85.67
Cropland	57	493	48	1	0	2	601	82.03
Grassland	55	44	384	0	0	9	492	78.05
Settlements	17	13	12	283	1	5	331	85.50
Wetlands	0	0	1	0	152	0	153	99.35
Otherland	2	0	3	0	0	24	29	82.76
Reference Total	651	598	487	284	153	40	2213	-
Producer Accuracy (%)	79.88	82.44	78.85	99.65	99.35	60.00	-	83.87

[2015 accuracy assessment already completed and to be inserted. 2000 and 2013 accuracy assessments to be completed and then included.]

Emission Factors

Deforestation emission factors were developed according to the stock-difference⁵² approach provided by the IPCC Guidelines (2006), and represents the difference between the pre-deforestation carbon stocks and post-deforestation carbon stocks for each stratum. Annex 7 offers detailed information about the sources, data, and methods used for determining pre-deforestation and post-deforestation land uses.

In some strata, where open forests were converted to plantations of agricultural tree crops, the change in carbon stocks resulted in net removals. As this is assumed to introduce perverse incentives into the REDD+ programme an emission factor of ZERO was applied.

Table 14: Description of deforestation emission factors

<p>Description of the parameter including the forest class if applicable:</p>	<p>Difference in carbon stocks (pre and post deforestation land cover) in the GCFRP Accounting Area per stratum. Strata were identified through the Forest Preservation Programme (FPP) Mapping of Forest Cover and Carbon Stock in Ghana project and represent all relevant IPCC land cover classes.</p> <p>Carbon pools:</p> <p><u>Pre-deforestation land use stocks:</u> Aboveground biomass, belowground biomass, deadwood, litter, non-tree vegetation, soil carbon stocks. Data on carbon pools were sourced from the FPP Mapping of Forest Cover and Carbon Stock in Ghana project.</p> <p><u>Post-deforestation land use carbon stocks:</u></p> <ul style="list-style-type: none"> • Cropland: <ul style="list-style-type: none"> ○ Herbaceous and shifting cultivation: Aboveground biomass, belowground biomass, deadwood, litter, non-tree vegetation, soil carbon stocks. Data on carbon pools were sourced from the FPP Mapping of Forest Cover and Carbon Stock in Ghana project. ○ Plantations: Aboveground biomass and belowground biomass (other carbon stocks conservatively omitted). Aboveground biomass values sourced from Konsager et al. (2013)⁵³ and
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⁵² UNFCCC, 2006. IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use (AFOLU), Generic Methodologies Applicable to Multiple Land-Use Categories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf

⁵³ Konsager et al. The carbon sequestration potential of tree crop plantations. Mitigation Adaptation Strategies for Global Change (2013) 18:1197–1213. Time-averaged results from http://orbit.dtu.dk/files/55883745/Carbon_Sequestration.pdf

	<p>belowground biomass stocks were determined by applying a root-to-shoot ratio developed by Mokany et al. (2006)⁵⁴.</p> <p><u>Grassland</u>⁵⁵: aboveground biomass. Values derived either from the FPP Mapping of Forest Cover and Carbon Stock in Ghana project or IPCC default values.</p> <p><u>Wetlands, settlement</u>⁵⁶, and <u>bareland/other</u>: carbon stocks assumed to be zero.</p>																																																																												
Data unit (e.g. t CO₂/ha):	t CO ₂ e/ha																																																																												
Value for the parameter:	<table border="1"> <thead> <tr> <th>Forest carbon Stratum/ Forest type</th> <th colspan="2">Post deforestation Stratum</th> <th>EF (t CO₂e/ha)</th> </tr> </thead> <tbody> <tr> <td colspan="4">Wet evergreen</td> </tr> <tr> <td rowspan="9">Closed forest</td> <td rowspan="5">Cropland</td> <td colspan="2">Cropland (herbaceous and fallow land)</td> <td>584</td> </tr> <tr> <td rowspan="4">Plantations</td> <td>Oil Palm</td> <td>314</td> </tr> <tr> <td>Citrus</td> <td>244</td> </tr> <tr> <td>Rubber</td> <td>116</td> </tr> <tr> <td>Cocoa</td> <td>244</td> </tr> <tr> <td colspan="2">Grassland</td> <td>520</td> </tr> <tr> <td colspan="2">Wetlands</td> <td>521</td> </tr> <tr> <td colspan="2">Settlement</td> <td>590</td> </tr> <tr> <td colspan="2">Bareland/other</td> <td>674</td> </tr> <tr> <td rowspan="9">Open Forest</td> <td rowspan="5">Cropland</td> <td colspan="2">Cropland (herbaceous and fallow land)</td> <td>203</td> </tr> <tr> <td rowspan="4">Plantations</td> <td>Oil Palm</td> <td>0.0</td> </tr> <tr> <td>Citrus</td> <td>0.0</td> </tr> <tr> <td>Rubber</td> <td>0.0</td> </tr> <tr> <td>Cocoa</td> <td>0.0</td> </tr> <tr> <td colspan="2">Grassland</td> <td>139</td> </tr> <tr> <td colspan="2">Wetlands</td> <td>140</td> </tr> <tr> <td colspan="2">Settlement</td> <td>208</td> </tr> <tr> <td colspan="2">Bareland/other</td> <td>293</td> </tr> <tr> <td colspan="4">Moist Evergreen</td> </tr> <tr> <td rowspan="3">Closed forest</td> <td rowspan="3">Cropland</td> <td colspan="2">Cropland (herbaceous and fallow land)</td> <td>652</td> </tr> <tr> <td rowspan="2">Plantations</td> <td>Oil Palm</td> <td>436</td> </tr> <tr> <td>Citrus</td> <td>366</td> </tr> </tbody> </table>			Forest carbon Stratum/ Forest type	Post deforestation Stratum		EF (t CO ₂ e/ha)	Wet evergreen				Closed forest	Cropland	Cropland (herbaceous and fallow land)		584	Plantations	Oil Palm	314	Citrus	244	Rubber	116	Cocoa	244	Grassland		520	Wetlands		521	Settlement		590	Bareland/other		674	Open Forest	Cropland	Cropland (herbaceous and fallow land)		203	Plantations	Oil Palm	0.0	Citrus	0.0	Rubber	0.0	Cocoa	0.0	Grassland		139	Wetlands		140	Settlement		208	Bareland/other		293	Moist Evergreen				Closed forest	Cropland	Cropland (herbaceous and fallow land)		652	Plantations	Oil Palm	436	Citrus	366
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⁵⁵ Except for moist evergreen and moist semideciduous NW forest strata where FPP data were available on carbon stocks for grassland and all carbon pools were included (aboveground biomass, belowground biomass, deadwood, litter, non-tree vegetation, soil carbon stocks)

⁵⁶ Except for the moist semideciduous NW forest strata where FPP data were available on carbon stocks in settlement and all carbon pools were included (aboveground biomass, belowground biomass, deadwood, litter, non-tree vegetation, soil carbon stocks)

			Rubber	238
			Cocoa	366
		Grassland		649
		Wetlands		640
		Settlement		705
		Bareland/other		785
Open Forest	Cropland	Cropland (herbaceous and fallow land)		120
		Plantations	Oil Palm	6
			Citrus	0.0
			Rubber	0.0
			Cocoa	0.0
	Grassland		181	
	Wetlands		176	
	Settlement		210	
	Bareland/other		253	
	Moist Semi-deciduous SE			
Closed forest	Cropland	Cropland (herbaceous and fallow land)		479
		Plantations	Oil Palm	413
			Citrus	343
			Rubber	215
			Cocoa	343
	Grassland		571	
	Wetlands		729	
	Settlement		608	
	Bareland/other		646	
Open Forest	Cropland	Cropland (herbaceous and fallow land)		61
		Plantations	Oil Palm	15
			Citrus	0.0
			Rubber	0.0
	Cocoa	0.0		
	Grassland		166	
	Wetlands		295	
	Settlement		174	
Bareland/other		228		
Moist Semi-deciduous NW				
Closed forest	Cropland	Cropland (herbaceous and fallow land)		224
		Plantations	Oil Palm	44
			Citrus	0.0
			Rubber	0.0
	Cocoa	0.0		

		Grassland		220		
		Wetlands		225		
		Settlement		217		
		Bareland/other		325		
	Open Forest	Cropland	Cropland (herbaceous and fallow land)		100	
			Plantations	Oil Palm		0.0
				Citrus		0.0
				Rubber		0.0
				Cocoa		0.0
		Grassland			106	
		Wetlands			312	
		Settlement			144	
		Bareland/other			201	
	Upland Evergreen					
	Closed forest	Cropland	Cropland (herbaceous and fallow land)		388	
			Plantations	Oil Palm		183
				Citrus		112
				Rubber		0.0
				Cocoa		112
		Grassland			373	
		Wetlands			655	
		Settlement			432	
	Bareland/other			501		
	Open Forest	Cropland	Cropland (herbaceous and fallow land)		341	
			Plantations	Oil Palm		206
				Citrus		136
				Rubber		0.0
				Cocoa		136
		Grassland			370	
Wetlands				549		
Settlement				376		
Bareland/other			454			
Source of data (e.g. official statistics, IPCC, scientific literature) or description of the assumptions, methods and results of any underlying studies that have been used to determine the	<p>Pre-deforestation carbon stocks:</p> <ul style="list-style-type: none"> Data were derived from the Forest Preservation Programme (FPP) which conducted the Mapping of Forest Cover and Carbon Stock in Ghana project. Data from this project offered estimates of all forest carbon pools, including soil. Deadwood carbon stocks appeared to be significantly over estimated, however, so IPCC defaults were applied for this pool (aboveground carbon stocks multiplied by 0.06) <p>Post-deforestation carbon stocks:</p>					

<p>parameter:</p>	<ul style="list-style-type: none"> • Cropland: FPP data on cropland carbon stocks per strata, reflecting all cropland (currently cropped or in fallow), rice fields, and agro-forestry systems • Plantations: Kongsager et al. 2013. Only above and belowground carbon stocks included. Belowground carbon stocks derived by applying Mokany (2006)⁵⁷ root-to-shoot ratio of 0.2 • Grassland: FPP data where available or IPCC default of 3.1 t C/ha • Wetlands: assumed to be zero • Settlement: FPP data where available assumed to be zero • Bareland/other: assumed to be zero <p>Further details provided in Annex 7.</p>			
<p>Spatial level (local, regional, national or international):</p>	<p>GCFRP Accounting Area GCFRP Accounting Area</p>			
<p>Discussion of key uncertainties for this parameter:</p>	<p>Forest carbon stock data are taken from the FPP project that estimated confidence intervals (95% of the mean) for the 6 forest carbon pools for each stratum.</p> <p>Generally, the FPP plot-based mean values are generated with small number of field plots for each of the ecological zone that leads to relatively high uncertainty. This will be decreased as more data are collected as the programme progresses.</p>			
<p>Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:</p>	<p>Forest carbon Stratum/ Forest type</p>	<p>Post deforestation Stratum</p>		<p>Uncertainty (%)</p>
<p>Wet evergreen</p>				
<p>Closed forest</p>	<p>Cropland</p>	<p>Cropland (herbaceous and fallow land)</p>	<p>14.2</p>	
		<p>Plantations</p>	<p>Oil Palm 21.9</p>	
			<p>Citrus 27.9</p>	
			<p>Rubber 36.6</p>	
			<p>Cocoa 11.8</p>	
	<p>Grassland</p>	<p>11.0</p>		
	<p>Wetlands</p>	<p>21.5</p>		
	<p>Settlement</p>	<p>6.9</p>		
<p>Bareland/other</p>	<p>18.1</p>			
<p>Open Forest</p>	<p>Cropland</p>	<p>Cropland (herbaceous and fallow land)</p>	<p>28.6</p>	
		<p>Plantations</p>	<p>Oil Palm 57.1</p>	
			<p>Citrus 64.1</p>	
			<p>Rubber 70.5</p>	
			<p>Cocoa 36.7</p>	

⁵⁷ Mokany K, Raison R.J, Prokushkin A.S 2006 Critical analysis of root : shoot ratios in terrestrial biomes. Global Change Biol. 12, 84–96. doi:10.1111/j.1365-2486.2005.001043.x.

	Grassland		5.5	
	Wetlands		36.6	
	Settlement		0.5	
	Bareland/other		36.3	
Moist Evergreen				
Closed forest	Cropland	Cropland (herbaceous and fallow land)	8.6	
		Plantations	Oil Palm	16.8
			Citrus	22.7
			Rubber	31.2
			Cocoa	8.0
	Grassland		5.0	
	Wetlands		6.3	
	Settlement		3.3	
	Bareland/other		10.0	
Open Forest	Cropland	Cropland (herbaceous and fallow land)	16.8	
		Plantations	Oil Palm	43.6
			Citrus	51.3
			Rubber	59.9
			Cocoa	31.7
	Grassland		26.4	
	Wetlands		41.4	
	Settlement		13.7	
	Bareland/other		33.7	
Moist Semi-deciduous SE				
Closed forest	Cropland	Cropland (herbaceous and s fallow land)	8.4	
		Plantations	Oil Palm	17.3
			Citrus	23.3
			Rubber	32.0
			Cocoa	8.0
	Grassland		5.8	
	Wetlands		12.0	
	Settlement		4.6	
	Bareland/other		9.1	
Open Forest	Cropland	Cropland (herbaceous and fallow land)	20.1	
		Plantations	Oil Palm	42.5
			Citrus	50.2
			Rubber	58.9
			Cocoa	17.9

	Grassland		27.1	
	Wetlands		36.6	
	Settlement		17.1	
	Bareland/other		31.0	
Moist Semi-deciduous NW				
Closed forest	Cropland	Cropland (herbaceous and fallow land)	12.2	
		Plantations	Oil Palm	36.6
			Citrus	45.3
			Rubber	55.1
			Cocoa	13.4
	Grassland		5.4	
	Wetlands		10.0	
	Settlement		2.5	
	Bareland/other		15.9	
	Open Forest	Cropland	Cropland (herbaceous and fallow land)	17.0
Plantations			Oil Palm	56.0
			Citrus	63.2
			Rubber	69.9
			Cocoa	24.6
Grassland			12.0	
Wetlands			19.0	
Settlement			4.4	
Bareland/other			25.3	
Upland Evergreen				
Closed forest	Cropland	Cropland (herbaceous and fallow land)	20.5	
		Plantations	Oil Palm	29.7
			Citrus	35.8
			Rubber	44.5
			Cocoa	16.7
	Grassland		22.8	
	Wetlands		26.3	
	Settlement		13.7	
	Bareland/other		25.1	
	Open Forest	Cropland	Cropland (herbaceous and fallow land)	23.2
Plantations			Oil Palm	45.7
			Citrus	53.9
			Rubber	62.3
			Cocoa	32.5
Grassland			14.7	

		Wetlands	43.0
		Settlement	7.2
		Bareland/other	32.6
<i>Uncertainties represent 95% confidence intervals as a percentage of the mean</i>			

8.3.3 Degradation from legal timber harvest activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

Calculations and final estimation of emissions follow the methods outlined by Pearson et al. (2014)⁵⁸. This method combines data on harvest volume (activity data) with an emission factor that reflects three emission sources that occur as a result of logging:

1. emissions from the milling, processing, use and disposal of the felled timber-tree,
2. emissions from incidental damage caused by the timber-tree fall and cutting of the log in the forest, and
3. emissions from infrastructure associated with removing the timber of the forest (e.g. skid trails, logging decks and logging roads).

The total emission factor from selective logging is estimated as the sum of three factors:

$$\text{TEF} = \text{ELE} + \text{LDF} + \text{LIF}$$

Where:

TEF	Total emission factor (t CO ₂ m ⁻³)
ELE	Emissions from extracted log (t CO ₂ m ⁻³)
LDF	Logging damage factor (t CO ₂ m ⁻³)
LIF	Logging infrastructure factor (t CO ₂ m ⁻³)

A committed emissions approach is employed in the calculations to simplify the carbon accounting process. This means that all emissions are accounted in the year of the logging event.

The TEF is then multiplied by annual timber extracted, in cubic meters per yr. from 2000-2015. Further detail on the methodology and assumptions made can be found in Annex B.

The legal timber harvest measurement approach is a direct accounting using activity data and emissions factors – as such it is NOT a proxy-based approach. The activity data is the recorded volumes of extracted timber, emission factors are derived from field measurement in Ghana and capture the change in carbon stocks as a result of the extracted volumes. For the sake of precision, the method does not look at the difference in forest carbon stocks with and without logging, which would be challenging and imprecise to measure. Instead, the change associated directly with each extracted cubic meter is estimated. The method thus involves only measurement of trees that have been felled or accidentally killed. As the measurement takes account of the whole dead trees, dead wood stocks and arguably even litter are effectively captured. The method also tracks the biomass extracted from the forest in the

⁵⁸ Pearson T.R.H., Brown, S. and Casarim, F. 2014. Carbon Emissions from Tropical Forest Degradation Cause by Logging. Environ. Res. Lett. 9 034017 (11pp). Winrock International. Available at: <http://www.winrock.org/sites/default/files/publications/attachments/Pearson%20et%20al%202014%20Logging.pdf>

timber logs and thus captures harvested wood products, however, the simplifying assumption of committed emissions is applied so the only storage in wood products is the stock estimated to still be in use 100 years after harvest.

Activity data

Ghana has timber extraction data for the entire historical period 2000-2015. These data present the total volumes of timber extracted annually by species and by administrative unit (region and locality) based on the Tree Information Forms (TIFs). These data are summed annually across administrative units to calculate total volumes.

Table 15: Description of legal timber harvest activity data

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	Average volume of the logs extracted annually from 2000-2015
Explanation for which sources or sinks the parameter is used (e.g. deforestation or forest degradation):	Degradation from legal timber harvest
Data unit (e.g. ha/yr):	m ³ /yr
Value for the parameter:	916,396 m ³ /yr
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	<p>These data present the total volume of logs extracted annually by species and by administrative unit (region and locality) based on the Tree Information Forms (TIFs).</p> <p>This is derived from diameter measurements at both ends of the bole in cm as well as the length of the bole in meters. The parameters measured are then used to estimate the volume using Smalian’s formula</p>
Spatial level (local, regional, national or international):	These data are summed annually across administrative units to calculate total volumes by areas of interest.
Discussion of key uncertainties for this parameter:	This is a forest concession census of actual timber volume extracted, so very small uncertainty is assumed—most likely as measurement error of the logs (diameters, lengths and number of logs). Standard operating procedure used for these measurements should minimize this, however.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	This is a forest concession census of actual timber volume, so very small uncertainty is assumed—most likely as measurement error of the logs (diameters, lengths and number of logs). Standard operating procedure used for these measurements should minimize this, however.

Emission Factors

Emission factors were derived from the methods in Pearson et al. (2014) and field data collected by the Ghana Forestry Commission in May 2016. The method takes a committed emissions approach. For harvested wood products a 30 year half-life is used following the IPCC (2006)⁵⁹ default for solid wood (Table 23), any products still in use 100 years after harvest are considered permanently sequestered. Further details are provided in the [Annex 7](#)

Table 16: Calculated values of emission factors for legal timber harvest

Factor		Value (tCO ₂ /m ³)	Uncertainty
Emission from Extracted Log	ELE	0.79	0.02
Logging Damage Factor	LDF	2.46	0.17
Logging Infrastructure Factor	LIF	0.50	0.13
Total Emission Factor	TEF	3.75	0.21

Table 17: Description of legal timber harvest emission factors

Description of the parameter including the forest class if applicable:	The emission factor for selective logging activity in Ghana, including emissions from extracted logs, logging infrastructure, and logging damage.
Data unit (e.g. t CO₂/ha):	t CO ₂ /m ³
Value for the parameter:	3.75 t CO ₂ e/ m ³
Source of data (e.g. official statistics, IPCC, scientific literature) or description of the assumptions, methods and results of any underlying studies that have been used to determine the parameter:	Field data collection by the Forestry Commission is the main source of data. Additional assumptions and data sources are explain in more details in see Annex B.
Spatial level (local, regional, national or international):	GCFRP Accounting Area GCFRP Accounting Area
Discussion of key uncertainties for this parameter:	The standard operating procedures (Annex 9) followed minimizes the uncertainty associated with data collection. Other sources of uncertainty include: <ul style="list-style-type: none"> - The average milling efficiency associated with legal timber harvest is based on a literature view and reported averages from the Forestry Commission. - Estimation of the weighted average of wood density based on Ghana Forestry Commission estimates per species logged. - A half-life of and a decay rate are applied as given in Table 12.2 in IPCC 2006⁶⁰.

⁵⁹ UNFCCC, 2006. IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use (AFOLU), Generic Methodologies Applicable to Multiple Land-Use Categories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf

⁶⁰ Footnote 53

	<ul style="list-style-type: none"> - carbon stock derived from the FPP inventory dataset. - no volumes could be paired with emission per length of road. This correlation instead had to rely on the study of Medjibe et al (2013) from Gabon.⁶¹ - For logging decks volume correlations were similarly unavailable. This correlation instead had to rely on the study of Medjibe et al (2013) from Gabon.⁶² This paired with FPP inventory data produced a decks emission factor.
<p>Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:</p>	<p>The emissions factors are developed based on 243 logging gaps measured by the Forestry Commission.</p> <p>The extracted log emission (ELE) had an uncertainty equal to 2.5% of the mean at the 95% confidence level.</p> <p>The logging damage factor (LDF) had an uncertainty equal to 6.9% of the mean at the 95% confidence level.</p> <p>The logging impact factor (LIF) had an uncertainty equal to 26% of the mean at the 95% confidence level.</p> <p>Using a weighted propagation of errors approach the total emission factor (TEF) had an uncertainty equal to 5.7% of the mean at the 95% confidence level.</p>

8.3.4 Degradation from illegal timber harvest activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

The approach for illegal timber harvest should be considered as a proxy method, as it relies on numbers for activity estimation from a published study for one point in time. The emission factors are Tier 2 and follow the same assumptions as for legal logging. The method involves only measurement of trees in Ghana that have been felled or accidentally killed. As the measurement takes account of the whole dead trees, dead wood stocks and arguably even litter are effectively captured). The method also tracks the biomass extracted from the forest in the timber logs and thus captures harvested wood products, however, the simplifying assumption of committed emissions is applied so the only storage in wood products is the stock estimated to still be in use 100 years after harvest.

Activity Data

Yearly activity data on the amount of timber harvested illegally in Ghana are not available at this time (but will become so as the MRV system is implemented). Instead, a number of studies have been conducted that provide estimates on the amount of illegal timber harvest. The study, 'Revisiting Illegal Logging and the Size of the Domestic Timber Market (Hansen et al. 2012) provides activity data on historical illegal timber harvest for Ghana's reference level.

Hansen et al estimated illegally logged timber at 4.1 million m³ per year in 2009 in the GCFRP Accounting Area. These numbers will be improved in a step-wise manner as Ghana develops a measurement system for illegal timber.

⁶¹ Medjibe, V.P., Putz, F.E., Romero, C. (2013) Certified and uncertified logging concessions compared in Gabon: Changes in stand structure, tree species, and biomass. Environmental Management. DOI 10.1007/s00267-012-0006-4

⁶² Medjibe, V.P., Putz, F.E., Romero, C. (2013) Certified and uncertified logging concessions compared in Gabon: Changes in stand structure, tree species, and biomass. Environmental Management. DOI 10.1007/s00267-012-0006-4

Table 18: Description of illegal timber harvest activity data

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	The activity data for illegal timber harvest at this stage will consist of the peer-reviewed literature estimate of Hansen et al. (2012). Hansen estimated illegal logged timber at 4.1 million m ³ per year in 2009.
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Degradation from illegal timber harvest
Data unit (e.g. ha/yr):	m ³ /yr
Value for the parameter:	4.1 million m ³ /yr
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	HANSEN, C.P., L. DAMNYAG, B.D. OBIRI and K. CARLSEN 2012. Revisiting illegal logging and the size of the domestic timber market: the case of Ghana <i>International Forestry Review</i> Vol.14(1), 2012 39 It can be reasonably assumed that the reported number reflects the estimated annual volume of illegally extracted timber in GCFRP accounting area because the paper states “the timber resources are located in the High Forest Zone”. It can also be expected that this number is an underestimate as illegal logging is believed to have increased in recent years. This will be conservative as actual illegal volumes are monitored under MRV
Spatial level (local, regional, national or international):	GCFRP Accounting Area
Discussion of key uncertainties for this parameter:	Uncertainty is unknown so at this stage prior to an illegal logging monitoring system in Ghana. Given the numbers here result from a single study in a single year, to be highly conservative an uncertainty value is used that is equal to half the value of the parameter.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	50% uncertainty is assumed. 4.1 million m ³ /yr ± 2.05 million m ³ /yr

Emission Factor

Illegal timber harvest does not differ in felling practices from legal timber harvest. Differences arise in the milling efficiency (chainsaw milling in the forest), and in extraction (milled timber carried out by hand rather than skidded out) (see Annex 7 for further detail on the methodology used).

Table 19: Calculated values of illegal timber harvest emission factor

Factor	Value (tCO ₂ /m ³)	Uncertainty
Emission from Extracted Log ELE	0.81	0.03

Logging Damage Factor	LDF	2.46	0.17
Total Emission Factor	TEF	3.27	0.17

Table 20: Description of illegal timber harvest emission factor

Description of the parameter including the forest class if applicable:	The emission factor for illegal logging activity in Ghana, accounting for emissions from extracted logs and logging damage.
Data unit (e.g. t CO₂/ha):	t CO ₂ /m ³
Value for the parameter:	3.27 t CO ₂ /m ³
Source of data (e.g. official statistics, IPCC, scientific literature) or description of the assumptions, methods and results of any underlying studies that have been used to determine the parameter:	Field data collection by the Forestry Commission is the main source of data. Additional assumptions and data sources are explained in further detail in Annex 7.
Spatial level (local, regional, national or international):	GCFRP Accounting Area
Discussion of key uncertainties for this parameter:	Following the standard operating procedures (Annex 9) minimizes the uncertainty associated with data collection. Other sources of uncertainty include: <ul style="list-style-type: none"> - The average milling efficiency associated with legal timber harvest is based on literature review. - Estimation of the weighted average of wood density based on Ghana Forestry Commission estimates per species logged. - A half-life of and a decay rate are applied as given in Table 12.2 in IPCC 2006⁶³. - Carbon stock derived from the FPP inventory dataset.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	The emissions factors are developed based on 243 logging gaps measured by the Ghana Forestry Commission. The extracted log emission (ELE) had an uncertainty equal to 3.7% of the mean at the 95% confidence level. The logging damage factor (LDF) had an uncertainty equal to 6.9% of the mean at the 95% confidence level. Using a weighted propagation of errors approach the total emission factor (TEF) had an uncertainty equal to 5.3% of the mean at the 95% confidence level.

8.3.5 Degradation from forest fire activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

The measurement approach for fire uses spatial data to capture area burned annually and IPCC factors to derive emission factors. The biomass values input incorporate live biomass (above and belowground)

⁶³ IPCC (2006) Guidelines for national greenhouse gas inventories. Volume 4: Agriculture, Forestry, and Other Land Use. <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

as well as down dead wood and litter as stocks impacted by degradation caused by forest fires. These stocks are derived from the FPP (as for deforestation).

Total emissions from forest fire were estimated using Equation 2.27 from IPCC (2006)⁶⁴:

$$L_{fire} = A * M_B * C_f * G_{ef} * 10^{-3}$$

Where:

L_{fire} = amount of greenhouse gas emissions from fire, tonnes of each GHG

A = area burnt, ha

M_B = mass of fuel available for combustion dry tonnes biomass ha⁻¹

C_f = combustion factor (proportion of pre-fire biomass that burns; from Table 2.6 IPCC 2006 GL), dimensionless; default value for tropical moist forest is 0.32 (less intense) to 0.50 (more intense), dimensionless

G_{ef} = emission factor, g kg⁻¹ dry matter burnt (from Table 2.5 IPCC 2006 GL) for each GHG as follows: 1580 for CO₂, 6.8 for CH₄, and 0.20 for N₂O

Activity Data

The MODIS burned area product was used to identify areas that experienced emissions due to forest fire between 2001 -2015. Only forest areas that remain forested and where forest fires occur but cause no change in land use were counted as forest degradation. Any areas that burned and were identified as deforestation were removed from degradation forest fire accounting. The analysis of agricultural tree plantations (methods discussed in Annex C) was used to adjust the burned area totals to account for fires that occurred on agricultural tree plantations rather than forestland, yet were classified as forestland by the land cover maps. Many areas experienced fires in several of the reference period years (Figure 10).

⁶⁴ IPCC (2006) Guidelines for national greenhouse gas inventories. Volume 4: Agriculture, Forestry, and Other Land Use. <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

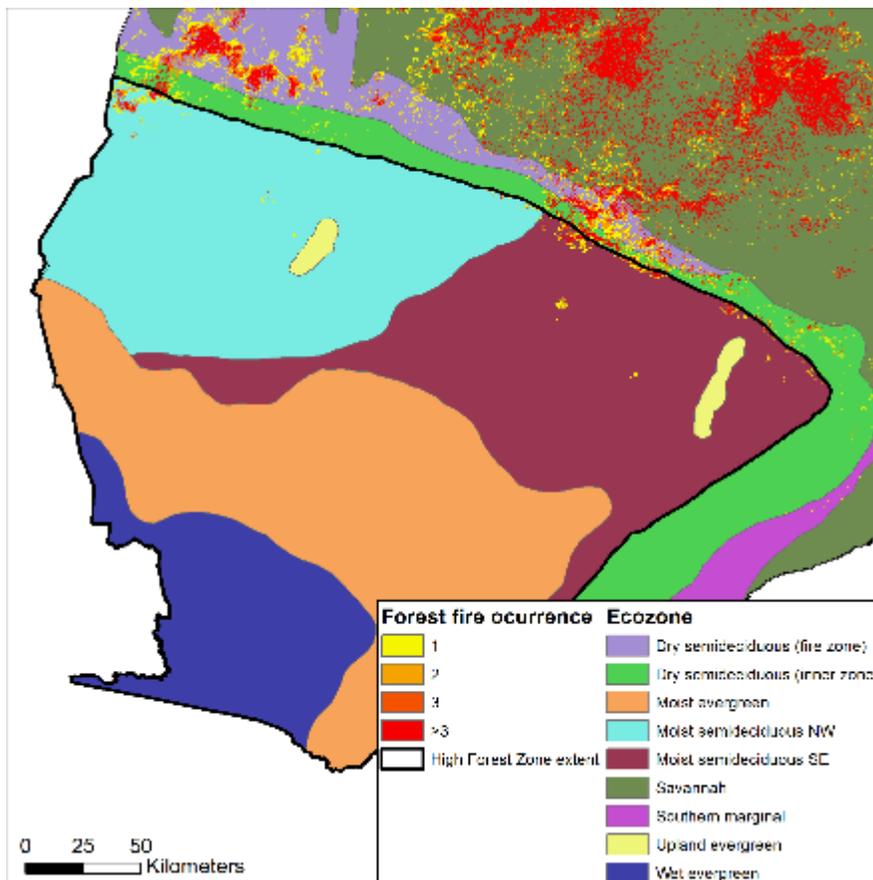


Figure 10: Fire recurrence in the GCFRP Area 2000-2015

Table 21: Description of fire activity data

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	Burned area for forest remaining forest between 2000 -2015.
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Forest degradation
Data unit (e.g. ha/yr):	Ha
Value for the parameter:	<p>Annual average by ecozone:</p> <p>Moist semideciduous (northwest subtype):</p> <p>Degradation fire: 346 ha</p> <p>Deforestation fire:760 ha</p> <p>Moist semi-deciduous (southeast subtype):</p> <p>Degradation fire: 657 ha</p> <p>Deforestation fire:120 ha</p>

	Total GCFRP Accounting Area Degradation fire: 1,004 ha Deforestation fire: 881 ha Deforestation fire: 899 ha
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	MODIS burned area product
Spatial level (local, regional, national or international):	MODIS product is international, but spatially explicit so detail is at the local level (500m resolution).
Discussion of key uncertainties for this parameter:	Given large pixel size (500m ²), the MODIS product is unlikely to capture small degradation fires. Surface fires are also unlikely to be captured as mortality of canopy vegetation is limited and cannot be detected by satellite images. Other potential remote sensing errors include: haze from smoke, cloud cover and coastal moisture effects.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	According to Roy and Boschetti (2009) ⁶⁵ , average MODIS burned area agreement with Landsat-measured burned area is 96%.

Emission Factor

Emission factors for fire are a combination of several factors: the biomass available for combustion (M_B), the combustion factor (C_f), and the emission factor (G_{ef}) for each key gas. M_B values were the same as used for deforestation, corresponding to the sum of the biomass stored in aboveground, belowground, deadwood, and litter pools in each of the ecozones within the Accounting Area GCFRP accounting area AREA. The combustion and emission factors were taken from IPCC (2006) Tables 2.6 and 2.5 respectively. One combustion factor, corresponding to primary tropical forests, was applied to all ecozones. Emission factors for tropical forests were applied for the three included gases, CO₂, CH₄, and N₂O.

Table 22: Description of fire emission factor

Description of the parameter including the forest class if applicable:	Biomass available for combustion		
Data unit (e.g. t CO ₂ /ha):	t C/ha		
Value for the parameter:	Forest carbon Stratum/ Forest type	EF	(t

⁶⁵ Roy DP and Boschetti L (2009) Southern Africa validation of the MODIS, L3RC, and GlobCarbon burned area products. *IEEE Transactions on Geoscience and Remote Sensing*: 47(4).

		CO ₂ e/ha)
	Wet evergreen	
	Closed Forest	142
	Open Forest	38
	Moist Evergreen	
	Closed Forest	174
	Open Forest	48
	Moist Semi-deciduous SE	
	Closed Forest	158
	Open Forest	47
	Moist Semi-deciduous NW	
	Closed Forest	61
	Open Forest	31
	Upland Evergreen	
	Closed Forest	103
	Open Forest	42
Source of data (e.g. official statistics, IPCC, scientific literature) or description of the assumptions, methods and results of any underlying studies that have been used to determine the parameter:	Forest Preservation Programme (FPP) forest carbon stock inventory collected through Mapping of Forest Cover and Carbon Stock in Ghana project.	
Spatial level (local, regional, national or international):	GCFRP Accounting Area	
Discussion of key uncertainties for this parameter:	<p>Forest carbon stock data are taken from the FPP project that estimated confidence intervals (95% of the mean) for the 6 forest carbon pools for each stratum.</p> <p>Generally, the FPP plot-based mean values are generated with small number of field plots for each of the ecological zone that leads to relatively high uncertainty. This will be decreased as more data are collected as the programme progresses</p>	
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Forest carbon Stratum/ Forest type	Uncertainty %
	Wet evergreen	
	Closed Forest	11.4
	Open Forest	1.8
	Moist Evergreen	
	Closed Forest	5.0
	Open Forest	27.2
	Moist Semi-deciduous SE	
	Closed Forest	5.8
	Open Forest	29.0

	Moist Semi-deciduous NW	
	Closed Forest	4.3
	Open Forest	11.4
	Upland Evergreen	
	Closed Forest	23.9
	Open Forest	15.3
<i>Uncertainties represent 95% confidence intervals as a percentage of the mean</i>		

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	Used Combustion factor from IPCC table 2.6. The value for all primary tropical forest.
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Forest degradation
Data unit (e.g. ha/yr):	Dimensionless
Value for the parameter:	0.36
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	IPCC (2006) Table 2.6
Spatial level (local, regional, national or international):	Global
Discussion of key uncertainties for this parameter:	Taken from IPCC (2006)
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Uncertainty as given by IPCC (2006) represents 36% of the value.

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	Emission factor
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest	Forest degradation

degradation):	
Data unit (e.g. ha/yr):	G kg ⁻¹ dry matter burnt
Value for the parameter:	CO ₂ : 1,580 CH ₄ : 6.8 N ₂ O: 0.2
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	IPCC (2006) Table 2.5
Spatial level (local, regional, national or international):	Global
Discussion of key uncertainties for this parameter:	Taken from IPCC (2006)
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Uncertainty as given by IPCC (2006) are as follows as a percentage of the value: CO ₂ : 6% CH ₄ : 29% N ₂ O: 100%

8.3.6 Degradation from Woodfuel activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

The measurement approach is to model supply and demand of fuelwood in the program area. This analysis was conducted for a single point in time. It can be considered a proxy-based approach. The supply of fuelwood captures the losses that occur to both above and belowground tree biomass when trees are felled for timber. Other pools are considered insignificant with degradation through fuelwood extraction.

The Woodfuel Integrated Supply/Demand Overview Mapping (WISDOM)^{66,67} approach is used to estimate carbon emissions from woodfuel use. The WISDOM approach models demand and supply dynamics and produces an estimate of non-renewable biomass (in tonnes) that is extracted for woodfuel use. Emissions can then be estimated by converting the estimate of non-renewable biomass into carbon, and then into CO₂ emissions.

An expansion factor of 1.32 was applied to the WISDOM estimates of non-renewable biomass to conservatively estimate the total biomass that is emitted as a result of woodfuel harvesting that results in forest degradation. This factor was taken from the American Carbon Registry's *Energy efficiency*

⁶⁶ <http://www.wisdomprojects.net/global/> Developed by Bailis et al. (2015)

⁶⁷ Bailis et al. (2015). The carbon footprint of traditional woodfuels. *Nature Climate Change* 5, 266-272. http://www.nature.com/nclimate/journal/v5/n3/full/nclimate2491.html?WT.ec_id=NCLIMATE-201503

measures in thermal applications of non-renewable biomass methodology⁶⁸, based on the CDM-approved methodology AMS-II.G, Version 05.0. This factor of 1.32 was based on the assumption that for every unit of biomass extracted from the forest, an additional 10% is left in the field from uncollected aboveground biomass. A further 20% was conservatively estimated to remain from root biomass. These factors, multiplied together, produced a 1.32 expansion factor.

Estimates of CO₂ emissions from woodfuel use in Ghana are available for the year 2009 produced using the WISDOM approach⁶⁹ at the district level (a full list of district-level non-renewable biomass estimates and emissions are included in the Annex 8). These estimates serve as a Tier 2 estimate of woodfuel emissions, but are not accompanied by uncertainty estimates. Instead, to be highly conservative an uncertainty equal to 50% of the given values will be applied. The estimates are for the year 2009, and therefore do not offer multiple data points with which to develop a true historical average of woodfuel emissions. Nevertheless, annual emissions for 2009 serve to represent annual emissions for each year in the historical reference period. Future work will create annual data while increasing the precision of woodfuel use estimates.

Table 23: Description of woodfuel activity data

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	Woodfuel emissions 2000-2015
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Forest degradation
Data unit (e.g. ha/yr):	t CO ₂ /yr
Value for the parameter:	702,133 t CO ₂ /yr
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	<p>WISDOM Model Inputs:</p> <p>Supply - Biomass + Productivity:</p> <ul style="list-style-type: none"> • Biomass Stocks (woody AGB without twigs and stumps) <ul style="list-style-type: none"> • <u>Geo-referenced plot data</u> from field surveys • <u>Forest inventories</u> of specific locations forest/vegetation types • <u>Empirically-derived maps of biomass distribution</u> (Saatchi et al. 2011; Baccini et al. 2012) • Productivity: Stock and Mean Annual Increment (IPCC) <p>Demand:</p> <ul style="list-style-type: none"> • GLOBAL Gridded Population Maps and Data • Global Administrative Unit Layers • International databases of forestry/energy statistics <ul style="list-style-type: none"> ○ FAOSTAT

⁶⁸ http://americancarbonregistry.org/carbon-accounting/standards-methodologies/energy-efficiency-measures-in-thermal-applications-of-non-renewable-biomass/acr-ams-ii-g_v-5-0_final.pdf

	<ul style="list-style-type: none"> ○ International Energy Agency ○ United Nations Energy ○ National-level data sources ○ World Health Organization databases on house hold fuel choice
Spatial level (local, regional, national or international):	GCFRP Accounting Area
Discussion of key uncertainties for this parameter:	The model combines a wide array of datasets and approaches and thus there is no single associated uncertainty estimate. As the numbers used result from a single year in the reference period, to be highly conservative prior to systematic collection of woodfuel data in Ghana, an uncertainty equal to 50% of the parameter value is assumed.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Uncertainty as a percentage of the parameter value: 50%

8.3.7 Enhancement of carbon stocks activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

The measurement approach relies on national statistics on areas planted in forest reserves, and applies removal factors representing the growth of planted trees. Ghana-specific numbers are included for teak but IPCC defaults are applied for other species. Only accumulation in above and belowground live tree biomass is included. All other pools are insignificant and given the increase in sequestration in the implementation case versus the reference level, any exclusion of pools is conservative.

The National Forest Plantation Development Programme (NFPDP) has engaged in a range of tree planting activities including a range of species (*Tectona grandis*, *Terminalia superba*, *Triplochiton scleroxylon*, *Mansonia altissima*, *Khaya anthotheca*, *Terminalia ivorensis*, *Pycnanthus angolensis*). Teak is the dominant species planted in the GCFRP Accounting Area, so activity data and removal factors for enhancement are categorized into two sub activities:

1. Establishment of teak species
2. Establishment of other broadleaf species

To track historical removals from enhancement activities in Ghana, the proposed approach will be to assume committed removals. This allows for a simplified accounting system that does not require tracking individual planted hectares over the course of their lifetime. Understanding that this approach would invariably lead to an overestimation of historic removals as plantation activities are subject to failure due to management failures or natural causes, the committed removals are discounted by integrating estimates of plantation failure rates. These estimates of failure rates were derived from official records.

Furthermore, NFPDP activities involve planting commercial timber species that are subject to eventual harvest. Areas under timber management are replanted with commercial timber species at the

completion of each harvest cycle. Therefore, the committed sequestration of a timber plantation is equal to the average carbon stocks of forest plantations over multiple harvest cycles.

Activity Data

Table 24: Description of CSE activity data

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	Average annual area of forests planted into the forest reserves between 2000 -2015, discounted by plantation failure rates.
Explanation for which sources or sinks the parameter is used (e.g. deforestation or forest degradation):	Carbon stock enhancements
Data unit (e.g. ha/yr):	Hectares planted/yr
Value for the parameter:	Teak: 1173 ha/yr Non-teak: 503 ha/yr
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	<p>National Forest Plantation Development Programme official statistics.</p> <p>The NFPDP collects data on for on-reserve tree establishment across Ghana, and include a number of programmes that took place along different timeframes between 2002 -2015: Government Plantation Development Programme (GPDP), Modified Taungya System (MTS), Community Forestry Management Project (CFMP), Model plantations, and other on-reserve planting programmes (detailed in Annex B).</p> <p>While spatial data were not available on area planted, historical tabular data are organized into hectares planted per forest reserve. For the development of historical removals within the GCFRP Accounting Area, it was necessary to isolate how many hectares were planted in forest reserves located within the ER-Programme area (GCFRP Accounting Area). Shapefiles of forest reserve boundaries were used to delineate which forest reserves were located within GCFRP Accounting Area boundaries, and only those inside the GCFRP Accounting Area were included. For plantings in forest reserves that fell both within and outside the GCFRP Accounting Area boundary, the proportion of the forest reserve inside and outside the boundary was calculated, and the only proportion of planted area within GCFRP Accounting Area boundary was applied.</p> <p>To account for plantation failure, the recorded annual area planted within the GCFRP Accounting Area was discounted based on official statistics from the NFPDP. These official statistics reflect the two distinct periods of activities that the NFPDP undertook, whereby the 2001-2009 period reflected plantation activities in forest reserves largely led by the public sector. Starting in 2010, activities shifted toward issuing private sector companies leases to establish plantations within forest reserves. This shift in activities and management appears to have resulted in significantly different plantation failure rates:</p>

	<ul style="list-style-type: none"> • 2001-2009: “Survey and Mapping of Government Plantation Sites Established between 2004 and 2009 in some Forest Reserves of Ghana” stated that 44.9% of the planted area was estimated to have failed during this time period. • 2010-2015: The NFPDP 2013 Dataset on Final Verification Nationwide included estimates of survival percentage per forest reserve. The average survival percentage for 2013 was reported as 75.43%, and thus a failure rate of 24.6% was applied. For the year 2013, actual survival rates per forest reserve were used rather than the average. <p>The adjusted annual estimates for area planted were then divided according to species composition, so that appropriate removal factors could be applied. The total estimated area of successful plantations was assumed to be comprised of 70% teak species and 30% other broadleaf species. This assumption about species composition was made based on expert opinion as well as a review of NFPDP data.</p>
Spatial level (local, regional, national or international):	GCFRP Accounting Area
Discussion of key uncertainties for this parameter:	The activity data used for the estimation of removals was derived from national census data, reported by the National Forest Plantation Development Programme. As such, no uncertainty is assumed.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Effectively zero uncertainty is assumed for this parameter.

Removal Factors

Removal factors represent the long-term average standing carbon stocks over the lifetime of each species, per hectare (i.e., half the max carbon stocks). Specific removal factors for both teak and other broadleaf species are available.

By applying committed removals, the impact of this activity are only accounted for once, in the year the plantation was established. The removal factors listed below represent the long-term average carbon stock accumulation of the tree plantation over several cycles.

Under this approach, removals are discounted to account for incidence of plantation failure in the activity data for removals.

Table 25: Description of CSE removal factor for teak

Description of the parameter including the forest class if applicable:	Calculated removal factor for carbon stock enhancement through plantation of teak in forest reserves (AGB and BGB)
Data unit (e.g. t CO₂/ha):	t CO ₂ /ha
Value for the parameter:	179 t CO ₂ /ha
Source of data (e.g. official statistics, IPCC, scientific literature) or description of the assumptions, methods and results of any underlying studies that have been used to determine the parameter:	Published literature (Adu-Bredu S., et al. 2008 ⁷⁰) on total tree carbon stocks in teak stands in moist evergreen forest in Ghana (98 Mg C/ ha) (included both aboveground and belowground carbon stocks). Long-term carbon stocks: $98 / 2 = 49$ = 179 t CO ₂ /ha
Spatial level (local, regional, national or international):	Moist evergreen forests in Ghana (GCFRP Accounting Area)
Discussion of key uncertainties for this parameter:	Adu-Bredu et al. (2008) was completed using temporary sample plots following standard operating procedures for the measurement of terrestrial carbon.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	While only the total tree carbon stocks were used for the development of removal factors, an estimation of statistical accuracy was offered in the form of the mean, minimum, and maximum carbon values for the total carbon stocks of the teak stands studied in the moist evergreen forest strata, as well as the standard deviation: Mean: 138 Minimum: 133 Maximum: 144 Based on these values a conservative value for uncertainty is 6% of the mean.

Table 26: Description of removal factor for non-teak

⁷⁰ Adu-Bredu S., et al. (2008). Carbon Stock under Four Land-Use Systems in Three Varied Ecological Zones in Ghana. Proceedings of the Open Science Conference on Africa and Carbon Cycle: the CarboAfrica project, Accra, Ghana, 25-27 November 2008. Available at <http://www.fao.org/3/a-l2240.pdf>

Description of the parameter including the forest class if applicable:	Calculated removal factor for carbon stock enhancement through plantation of trees (non-teak) in forest reserves (AGB and BGB)
Data unit (e.g. t CO₂/ha):	t CO ₂ /ha
Value for the parameter:	196 t CO ₂ /ha
Source of data (e.g. official statistics, IPCC, scientific literature) or description of the assumptions, methods and results of any underlying studies that have been used to determine the parameter:	<p>IPCC AFOLU Vol. 4 table 4.8 above-ground biomass in forest plantations. Values for 'Africa broadleaf >20 years' for three ecological zones in the GCFRP Accounting Area (tropical rain forest, tropical moist deciduous forest, and tropical dry forest) were averaged, and converted to carbon (86.65 t C/ha). The belowground biomass value was generated by applying a root-to-shoot ratio of 0.235 for tropical/subtropical moist forest/plantations >125 Mg ha⁻¹ (Mokany et al.2006)⁷¹. This rendered a total stock of 107 t C/ha.</p> <p>Long-term carbon stocks: 107/2 = 53.5 t C/ha =196 t CO₂/ha.</p>
Spatial level (local, regional, national or international):	GCFRP Accounting Area
Discussion of key uncertainties for this parameter:	<p>For the development of this parameter, IPCC defaults for aboveground biomass in forest plantations in Africa were applied. Given they are continental averages for all broadleaf species, uncertainty can be assumed to be high.</p> <p>As belowground biomass stocks are produced using a root-to-shoot ratio (Mokany et al., 2006)⁷², and therefore values are tied to the estimates for aboveground biomass.</p>
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	No uncertainty values were offered in the IPCC tables (both IPCC 2003 and 2006) for this parameter, while there is uncertainty in the specific number for removal stock the scale of the variation is constrained biologically. Thus here, a 33% is adopted.

8.3.9 Calculation of the average annual historical emissions over the Reference Period

The annual emissions and removals defined in the FREL are estimated according to the following equation:

⁷¹ Mokany K, Raison R.J, Prokushkin A.S 2006 Critical analysis of root : shoot ratios in terrestrial biomes. Global Change Biol. 12, 84–96. doi:10.1111/j.1365-2486.2005.001043.x.

⁷² Mokany K, Raison R.J, Prokushkin A.S 2006 Critical analysis of root : shoot ratios in terrestrial biomes. Global Change Biol. 12, 84–96. doi:10.1111/j.1365-2486.2005.001043.x.

$$FREL = (CDefor_{REL} + CDegrad_{REL(LTH)} + CDegrad_{REL(ITH)} + CDegrad_{REL(F)} + CDegrad_{REL(FW)} + CRefor_{REL})$$

Where:

<i>FREL</i>	Projected annual emissions and removals from the forest sector summed across all strata; t CO ₂ -e/yr
<i>CDefor_{REL}</i>	Predicted annual emissions from deforestation in each stratum; t CO ₂ -e/yr
<i>CDegrad_{REL(LTH)}</i>	Predicted annual emissions from forest degradation on forestland remaining forestland from legal timber harvest; t CO ₂ -e/yr
<i>CDegrad_{REL(ITH)}</i>	Predicted annual emissions from forest degradation on forestland remaining forestland from legal timber harvest; t CO ₂ -e/yr
<i>CDegrad_{REL(F)}</i>	Predicted annual emissions from forest degradation on forestland remaining forestland from legal timber harvest; t CO ₂ -e/yr
<i>CDegrad_{REL(FW)}</i>	Predicted annual emissions from forest degradation on forestland remaining forestland from legal timber harvest; t CO ₂ -e/yr
<i>CEnhanc_{REL}</i>	Predicted annual emissions from afforestation and reforestation; note net removals from the atmosphere are depicted by a negative sign; t CO ₂ -e/yr

Details for estimations from each activity can be found in the [Annex 7](#).

8.4 Estimated Reference Level

The annual average emissions for the 15-year period from 2000 to 2015 from deforestation was 28.7 million tCO₂e (Table 11). Emissions were highest from the moist evergreen ecozone, which accounted for 42% of the total in the GCFRP Accounting Area ([Figure 11](#)).

Table 27: Emission from deforestation for the GCFRP Accounting Area between 2000-2015

Ecozone	Forest structure	Annual area deforested (ha)	Annual Emissions (tCO ₂ yr ⁻¹)	Non-CO ₂ gas emissions from fire (tCO ₂ e yr ⁻¹)	Total Emissions from deforestation (tCO ₂ e yr ⁻¹)
Wet evergreen	Closed forest	10,810	4,621,636	0	4,621,636

	Open forest	11,022	1,865,630	0	1,865,630
Moist evergreen	Closed forest	14,162	7,327,264	4	7,327,268
	Open forest	36,544	4,183,889	0	4,183,889
Moist semideciduous SE	Closed forest	12,238	5,079,048	770	5,79,818
	Open forest	23,140	1,565,953	768	1,566,721
Moist semideciduous NW	Closed forest	7,153	574,516	90	574,606
	Open forest	22,026	1,730,270	4,020	1,734,290
Upland evergreen	Closed forest	687	149,113	0	149,113
	Open forest	586	182,471	0	182,471
Total HFZ		138,368	27,285,442	5,652	27,285,442

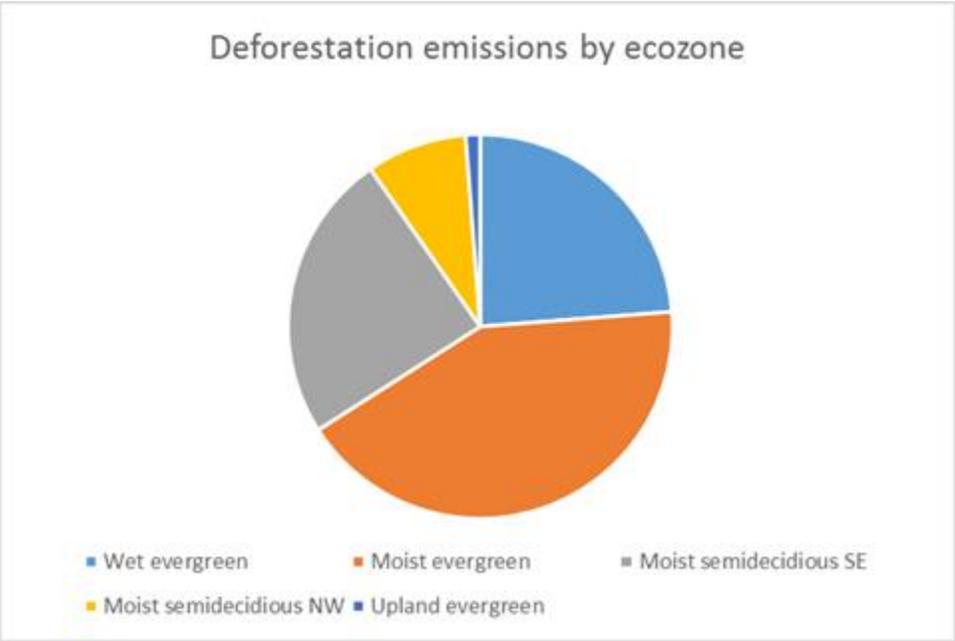


Figure 11: Deforestation emissions by ecozone

Degradation from Legal Timber Harvest

The annual average emissions over a 15-year period from 2000 to 2015 from legal logging was 3,436,486 tCO₂e between 2000 -2015. In general, emissions were higher at the beginning of the reference period, with 2002 having the highest amount of emissions (4.9 M t CO₂e). After a sharp decrease between 2002 and 2004 emissions fluctuate near the reference level average before a short spike in 2013 of roughly 3.6 M tCO₂e. In 2014 and 2015 emissions decreased steadily (see [Figure 12](#))

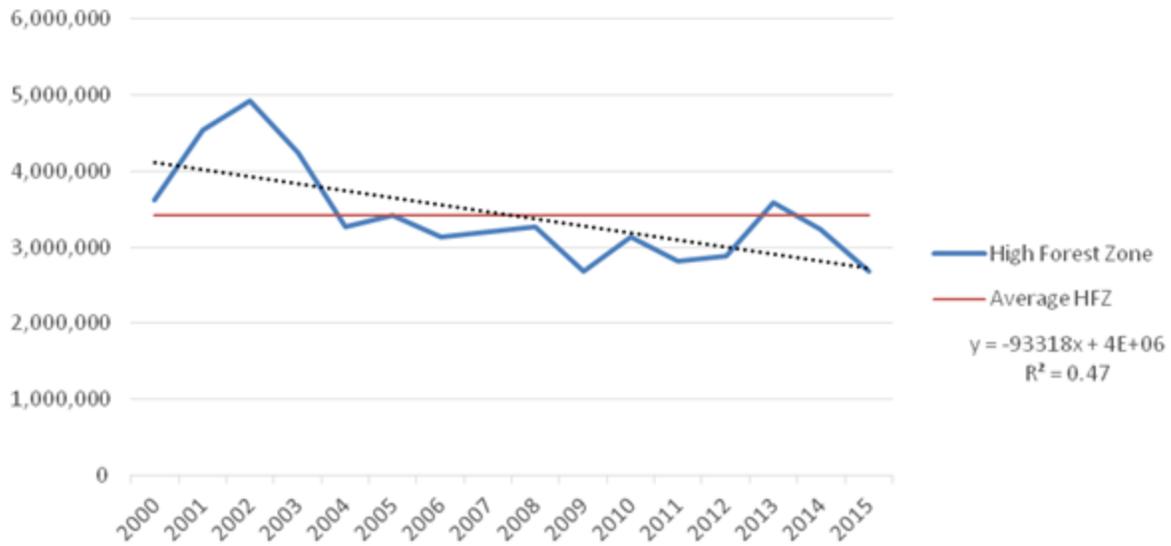


Figure 12: Emissions from legal logging (in t CO_{2e})

Illegal Logging

The annual average emissions from illegal logging over a 15-year period from 2000-2015 were 13,407,000tCO_{2e}.

Woodfuel

Using the data for woodfuel from 2009 as a proxy for the average emissions from woodfuel over the reference period the average annual emission between 2000 and 2015 were 899,499 tCO_{2e}.

Degradation from Fire

The annual average emissions from forest fire from 2001 to 2015 were 44,447 tCO_{2e}. In general, emissions were higher in the second half of the reference period, with 2009 having the highest amount of emissions (Figure 13). Emissions were highest from the moist semideciduous ecozones (Figure 14).

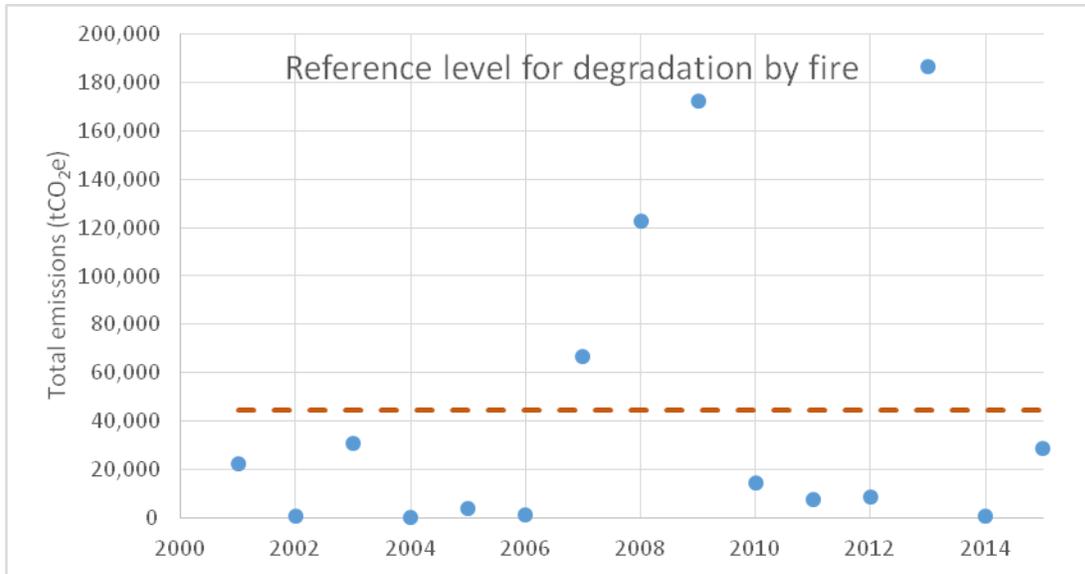


Figure 13: Emission from forest fire 2001-2015

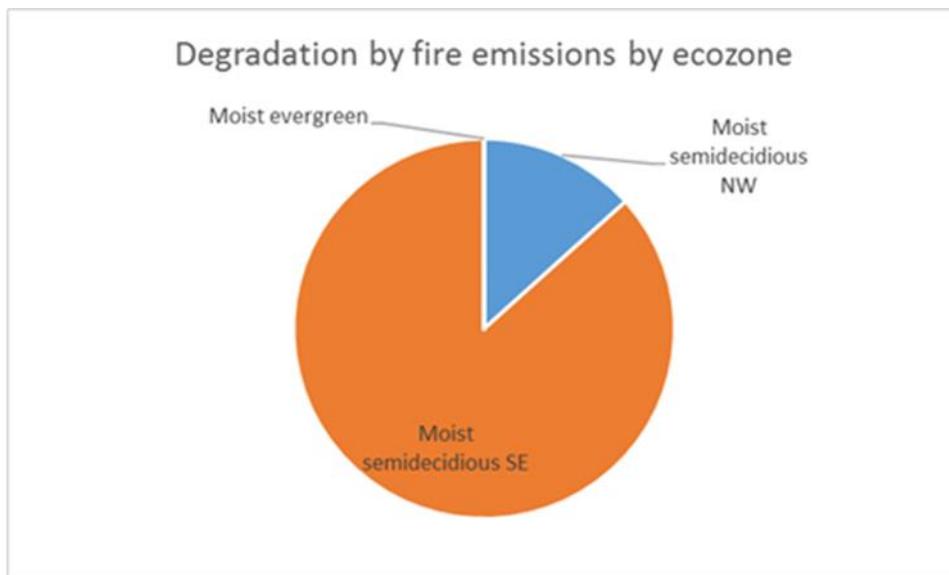


Figure 14: Emissions from fire from 2001 to 2015

Summed reference level

When summed together, the average annual emissions from 2000-2015 were 44.5 million tCO₂e yr⁻¹. 61% of emissions were due to deforestation, while legal and illegal logging made up 38% combined. Fuelwood and forest fire accounted for a minimal percentage of total emissions, making up just 2% and 0.10% respectively (Figure 15).

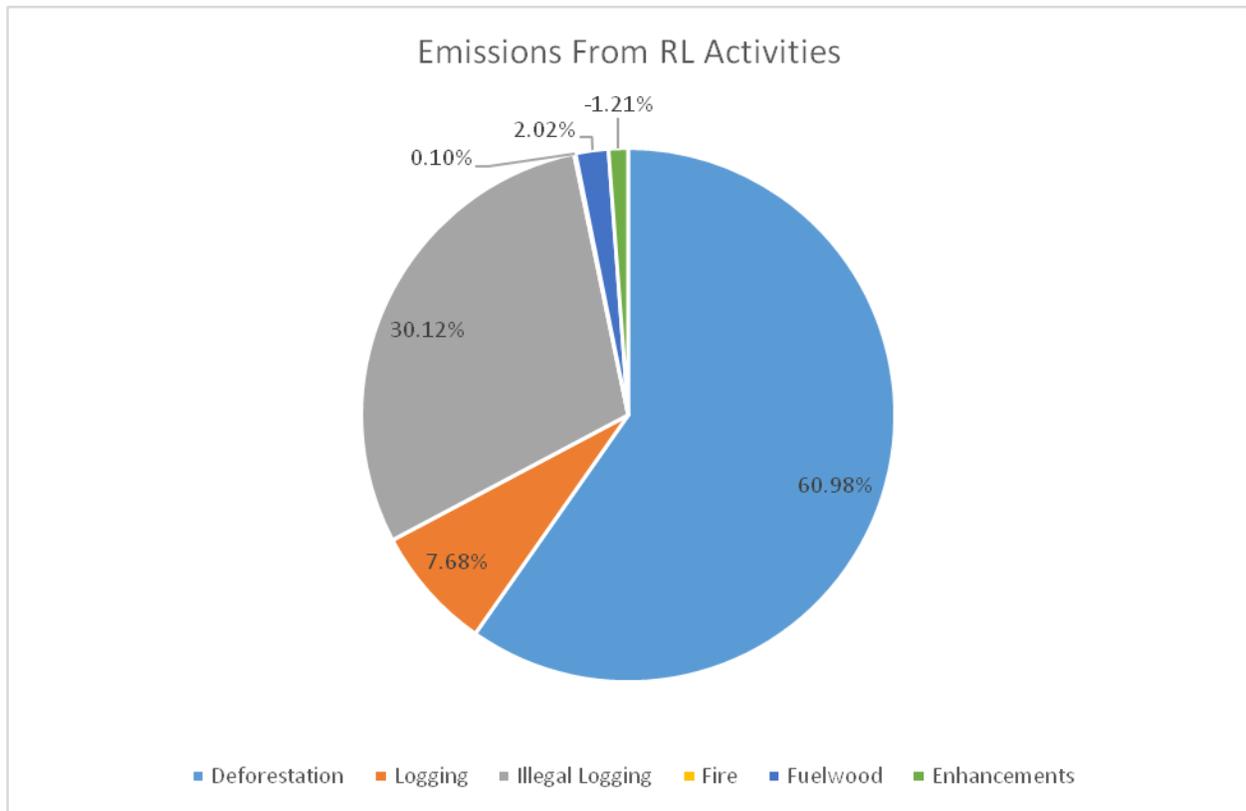


Figure 15: Relative annual emissions from each reference level activity

Table 28: GCFRP Reference Level

ERPA term year t	Average annual historical emissions from deforestation over the Reference Period (tCO ₂ -e/yr)	Average annual historical emissions from forest degradation over the Reference Period (tCO ₂ -e/yr)				Average annual historical removals by sinks over the Reference Period (tCO ₂ -e/yr)	Reference level (tCO ₂ -e/yr) woodfuel collection)
		woodfuel collection)	legal timber harvest	illegal timber harvest	Fire		
1	27,285,442	899,499	3,419,024	13,407,000	44,447	538,993	44,516,419
2	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
3	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
4	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
5	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
6	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
7	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
8	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
9	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
10	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
11	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
12	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419

13	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
14	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419
15	27,285,442	899,499	3,419,024	13,407,000	44,447	-538,993	44,516,419

8.5 Relation between the Reference Level, the development of the FREL/FRL for the UNFCCC and the country's existing or emerging greenhouse gas inventory

Ghana has an innovative institutional arrangement to report its national GHG emissions because it has adopted an evolving system that allows room for changes and enhancements and takes advantage of lessons and lapses of preceding efforts. The current arrangement involves a wide range of stakeholders drawn across the energy, industrial, AFOLU, agriculture and waste management sectors of the economy.

The reference level developed for the ER-Programme, will serve as the framework for FRL submitted to the UNFCCC. The reference level for the ER-Programme includes data for the GCFRP Accounting Area (GCFRP Accounting Area) alone. The submission to the UNFCCC will include all activities covered for the ER-Programme, but include data at the national scale. **The FRL is currently under development and will be completed at the end of 2016, following the completion of the REL for the GCFRP.**

The majority of the underlying data used to report on the national greenhouse gas inventory is the same as the data used for the ER-Programme and the eventual UNFCCC submission. However, for the ER-PD submission, estimates from forest converted to other land (or deforestation) will vary as efforts have been made to differentiate between natural forest, tree crops (such as citrus, rubber and palm oil) and cocoa plantation. This is a limitation that the GHG inventory is aware of in their estimates and will work to address in future reporting, using the methods developed for the ER-Programme (see **Annex 8** for a detailed description of the methodology used to differentiate tree crops from natural forest).

9. APPROACH FOR MEASUREMENT, MONITORING AND REPORTING

9.1 Measurement, monitoring and reporting approach for estimating emissions occurring under the ER Program within the Accounting Area

This section demonstrates Ghana's approach for measuring, monitoring and reporting against the reference level. The same methods described in **Annex 7** will be used when reporting against the reference level. Assuming a 2017 start date, reporting will occur every two years although the monitoring of certain activities (e.g. legal timber harvest) will occur over different time periods as explained below.

Stepwise improvements that could be adopted to improve both the data and methodological approaches for the development of specific AD and EFs are offered in **Annex 10**. Where such improvements are made then the reference level will be revisited and recalculated, where appropriate, with improved emission factors or alternate activity data.

DEFORESTATION

Estimated emissions from deforestation for the monitoring period will be based on the emission factors developed for the reference level and updated change in forest cover per the identified strata. Emission factors will remain constant until carbon stocks are updated by new forest inventories (envisioned prior to reference level renewal). Activity data will be captured using analysis of Landsat imagery biannually. This analysis will be in line with the remote sensing undertaken for the national GHG inventory.

Table 29: Deforestation MMR approach for estimating emissions

Parameter:	Hectares of land deforested
Description:	Forest land converted to non-forest land for the open and closed forest in each of the ecological zones
Data unit:	Hectares
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	<p>Activity data will be obtained from land cover maps based on 30 m resolution Landsat 8 imagery analyzing forest cover change biannually during the course of the ER-PA. Forest will be stratified between “open” and “closed” forest, and five ecological zones (wet evergreen, moist evergreen, moist semi-deciduous SE, moist semi-deciduous NW, upland evergreen).</p> <p>High resolution analysis described in Annex 8 will be applied to future monitoring events to map areas of agricultural tree plantations.</p>
Frequency of monitoring/recording:	Every 2 years
Monitoring equipment:	Remote sensing analysis software and GIS software
Quality Assurance/Quality Control procedures to be applied:	<p>QA/QC will be accomplished in a two-step process—</p> <ul style="list-style-type: none"> i) A set of SOP for mapping using Landsat has been developed and all interpreters trained during a training in July, 2016, led by Winrock International on the use of the SOPs, and ii) Remote sensing analysis will be verified using ground truthing along with high resolution imagery such as Google Earth based on a robust verification plan for accuracy assessment.
Identification of sources of uncertainty for this parameter	Key uncertainties include error in remote sensing classification due to haze, cloud cover, stripping from a Landsat 7 satellite malfunction, differences in seasonal greenness, and reflectance differences between Landsat images
Process for managing and reducing uncertainty associated with this parameter	Remote sensing classification and accuracy assessment will be improved using new technologies that arise that allow for enhanced removal of atmospheric interference and improved classification schemes. Efforts will be made however, to maintain consistency with reference level maps, or update reference level maps using newer technology.
Any comment:	RMSC will be responsible for image acquisition and processing of images for activity data. FSD and RMSC will be responsible for collection of training data sets. CERSGIS and the MRV Subworking group will be responsible for QA/QC
Roles and responsibilities	

DEGRADATION FROM LEGAL TIMBER HARVEST

Estimated emissions from degradation for legal timber harvest for the monitoring period will be based on the emission factors developed for the reference level and yearly reporting of extracted timber volumes. Emission factors will remain constant until such a time that new field data are gathered during the programme's lifetime or it is demonstrated that logging practices in-country are significantly altered (reassessment prior to reference level renewal). [Annex 9](#) offers specific suggested Standard Operating Procedures (SOPs) for the gathering of data to support the development of country-specific emission factors. The current emission factors were developed with Ghana country-specific data based on field work conducted in May 2016 by Ghana Forestry Commission Staff and Winrock International, but additional data would further strengthen emission factors.

Table 30: Degradation from legal timber harvest MMR approach for estimating emissions

Parameter:	Volume of logs extracted annually
Description:	These data are summed annually across administrative units to calculate total volumes for the GCFRP Accounting Area.
Data unit:	m ³
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	<p>These data present the total volume of logs extracted annually by species and by administrative unit (region and locality) based on the Tree Information Forms (TIFs).</p> <p>These are derived from diameter measurements at both ends of the bole in cm as well as the length of the bole in meters. The parameters measured are then used to estimate the volume using Smalian's formula</p>
Frequency of monitoring/recording:	Yearly
Monitoring equipment:	Field measurements
Quality Assurance/Quality Control procedures to be applied:	SOPs for field measurement and data analyses
Identification of sources of uncertainty for this parameter	This is a forest concession census of actual timber volume extracted, so very small uncertainty is assumed—most likely as measurement error of the logs (diameters, lengths and number of logs). Standard operating procedure used for these measurements should minimize this, however.
Process for managing and reducing uncertainty associated with this parameter	Standard operating procedure used for these measurements should minimize this, however.
Any comment:	

DEGRADATION BY ILLEGAL LOGGING

Country-specific emission factors have been estimated for illegal timber harvesting for Ghana as explained in the reference level section and will remain constant throughout the monitoring period unless a significant change in illegal logging practices is observed and/or updated biomass inventories are conducted. The Emission Factors were developed with data collected in May 2016 by Ghana Forestry Commission Staff and Winrock International following the SOPs offered in [Annex 9](#).

Concerning activity data, district rangers currently report timber harvest from intercepted illegal logging, which can serve as a framework to monitor volume extracted from illegal logging during the monitoring period. However, it is generally accepted that the data currently reported underrepresents the true scope of illegal logging practices. **A more robust methodology as used by the Hansen study will be adopted for illegal timber harvest estimates**

Table 31: Degradation from illegal timber harvest MMR approach for estimating emissions

Parameter:	Volume of logs extracted annually
Description:	These data are summed annually across administrative units to calculate total volumes for the GCFRP Accounting Area.
Data unit:	m ³
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	RMSC will work with FORIG, forest rangers and employees of the timber market to conduct around-the-clock market monitoring of wood-transporting vehicles over a two-week period during the dry season (peak season) and during a two-week period in the rainy season (low season). Rangers will be placed at strategic positions within the markets or at entry gates and record for each vehicle entering the markets: (i) the date; (ii) time; (iii) type of vehicle, and (iv) supply source, i.e. chainsaw processed or sawmill processed lumber, respectively. Further detail of the methodology can be found in the Hansen et al. 2012 paper.
Frequency of monitoring/recording:	Yearly
Monitoring equipment:	Field measurements
Quality Assurance/Quality Control procedures to be applied:	Following SOPs developed by the Forestry Commission
Identification of sources of uncertainty for this parameter	Assumed high levels of uncertainty because the data collected does not currently represent the full scope of illegal activity.
Process for managing and reducing uncertainty associated with this parameter	Consistent training of field crews and field data collection and recording QA/QC measures. Incentivizing district rangers to track and report all illegal activity.

DEGRADATION BY WOODFUEL COLLECTION

For the historical reference period, emissions from forest degradation as a result of woodfuel harvest were estimated using the WISDOM approach. Estimates of nonrenewable biomass for the year 2009 were produced by modeling demand and supply dynamics. The estimates were produced as part of a pantropical study (Bailis et al. 2015)⁷³ and thus stepwise improvements can be realized through country-specific data collection and re-modeling of supply and demand dynamics to better reflect unsustainable woodfuel collection practices in Ghana. Monitoring that could be done includes: surveys of household and industrial woodfuel use to determine volume of wood being burned annually, surveys of number of households/families using woodfuel, surveys of any change in woodfuel stoves by rate of adoption and type e.g., surveys of amount of woodfuel being supplied through deforested areas and non-forest areas such as agricultural lands, plantations, and agroforestry, and/or field inventories to determine growth rates of natural forests.

⁷³ Bailis et al. (2015). The carbon footprint of traditional woodfuels. *Nature Climate Change* 5, 266-272.

It is recommended that in-country capacity is built on the application of the WISDOM model for estimating emissions from woodfuel use. Not only will this be necessary to measure the impact of interventions in the ER-Programme area for this activity, but will likely be especially important if the emissions reduction programme is to expand beyond the GCFRP Accounting Area where emissions from forest degradation as a result of woodfuel harvesting is more significant. Ghana's REDD+ strategy articulates the improvement and sustainability of woodfuel harvest and use in the 'transition' and savannah zones as a key option in reducing national emissions from deforestation and degradation, so the ability to produce reliable estimates of the impacts of this activity will be essential in monitoring and measuring the impact of measures that do so.

Table 32: Degradation from woodfuel harvest MMR approach for estimating emissions

Parameter:	Woodfuel supply
Description:	Biomass available for woodfuel harvest
Data unit:	Volume (m ³) or mass (kg) of wood
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	<p>Woodfuel supply is a measure of both the existing biomass in woodsheds as well as their productivity. Productivity is an important consideration as it accounts for the ability of biomass stocks to regenerate once harvested for woodfuel use).</p> <p>The following sources can contribute to the estimation of woodfuel supply:</p> <ul style="list-style-type: none"> • Biomass Stocks • Forest inventories and plot data • Productivity (mean annual increment) • Published literature • Field studies
Frequency of monitoring/recording:	Depending on resources and national circumstances, every 2-5 years
Monitoring equipment:	N/A
Quality Assurance/Quality Control procedures to be applied:	Consultation with WISDOM modeling experts
Identification of sources of uncertainty for this parameter	Uncertainty in biomass stocks and stock accumulation in woodfuel sourcing forests.
Process for managing and reducing uncertainty associated with this parameter	Increased field data collection. Consistent training of field crews and field data collection and recording QA/QC measures.
Any comment:	

Parameter:	Woodfuel demand
Description:	How much woodfuel populations use
Data unit:	Volume (m ³) or mass (kg) of wood
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data,	Woodfuel demand is largely a function of population and population density, infrastructure, household energy supply needs, and access to woodsheds.As such, the following sources of data can support the estimation of woodfuel demand:

national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	<ul style="list-style-type: none"> • Population census • Spatial data on infrastructure (e.g., roads, gas pipelines) • Topography • Surveys of household energy needs and use
Frequency of monitoring/recording:	Depending on resources and national circumstances, every 2-5 years
Monitoring equipment:	N/A
Quality Assurance/Quality Control procedures to be applied:	Consultation with WISDOM modeling experts
Identification of sources of uncertainty for this parameter	Measurement error, inconsistencies or errors in survey execution
Process for managing and reducing uncertainty associated with this parameter	Consistent training of field crews and field data collection and recording QA/QC measures.
Any comment:	

DEGRADATION BY FIRE

Measurement of fire will continue on an annual basis as the MODIS burned area product is released allowing for updated activity data. Emission factors will remain constant until carbon stocks are updated by new inventories during the programme's lifetime (expected prior to reference level renewal). For each biannual monitoring and reporting event, annual averages of burned area and emissions will be calculated from the annual monitoring data.

Table 33: Degradation from fire MMR approach for estimating emissions

Parameter:	Area burned
Description:	Area burned by forest fires
Data unit:	Ha
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	MODIS burned area product
Frequency of monitoring/recording:	Annual
Monitoring equipment:	GIS software
Quality Assurance/Quality Control procedures to be applied:	None; global dataset
Identification of sources of uncertainty for this parameter	Error in remote sensing Uncertainty in carbon stock estimates (as for deforestation)
Process for managing and reducing uncertainty associated with this parameter	None

Any comment:	
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CARBON STOCK ENHANCEMENTS

For the historical reference period, removals from NFPDP activities were estimated by combining annual records of forest planting with removal factors derived either from published literature or from IPCC defaults reflecting the carbon content of forest plantations in Africa. Removals were assumed to be committed to facilitate accounting, but failure rates were applied, based on data collected and reported by the NFPDP. During the MRV period, removals will also be assumed to be committed in the year plantations are established and failure rates will be applied to discount removals for plantations that ultimately do not successfully sequester carbon from the atmosphere. However, it is important that failure rates are collected more systematically to more accurately reflect AD.

During the MRV period, removal factors will be consistent with those applied in the development of the reference level where they represent the long-term average carbon stocks of forest plantations (reflecting carbon stocks across multiple harvest cycles, under the assumption that forest plantations in Ghana will undergo rotational harvest).

Measurement

While current data collected by the NFPDP through annual censuses will continue to serve as a key source of data for measuring and monitoring enhancement activities *under* the MRV programme, it will be necessary to integrate additional data to allow for plantations to be spatially mapped to allow for monitoring of plantation performance throughout the MRV period.

Key data collected by the NFPDP censuses must include:

- Spatially delineated planted area to facilitate measurement and monitoring of planted areas.
- Annual data collection on species planted per forest reserve (these data appear to be available in NFPDP records for 2013, but were not available prior to or after that year).
- Annual data collection on verified area planted (ha) (these data appear to be available in NFPDP records from 2010 through 2013, but were not available prior to or after that year).
- Annual data on survival percentage of planted trees (these data appear to be available in NFPDP records for 2013, but were not available prior to or after that year).

For most years, historical data were not available on species planted per forest reserve, so for the development of the RL, it was assumed 70% of species planted were teak, and 30% non-teak. Under the MRV programme, activity data will be divided by species (teak and non-teak) to apply the appropriate removal factor to generate more accurate estimates of removals that reflect the planted species composition. This may be especially important if removals are to be accounted for nationally where the 70/30% species composition is not true for other parts of the country.

Monitoring and Reporting

Failure rates: While data on survival percentage of planted trees are collected in annual surveys of area planted under the NFPDP, reported survival rates reflect only that of the first year after planting. As such, it will be necessary to monitor the performance of plantations established under the NFPDP throughout the entire period of performance to ensure the accurate reporting of removals.

Monitoring performance will be achieved through the creation of a spatial database of area planted under NFPDP starting in 2017. For monitoring the performance of planted areas, a number of the

plantations established in each year of the period of performance could be randomly selected and assessed systematically by trained spatial analysts applying high-resolution spatial imagery (e.g., Google Earth) to generate estimates of survival. This approach would represent a more cost-effective option for monitoring (as opposed to site visits) and would allow for a greater set of sites to be assessed. Based on the total number of sites planted in each forest reserve in the GCFRP Accounting Area, for every year in the reporting period, either 100 sites or 5% of the total area planted (whichever represents a lower number of sites) will be randomly selected for assessment of plantation survival. Trained spatial analysts would assess the performance of the area planted at each of those sites, according to standardized guidelines and thresholds to objectively determine the performance of the planted sites. Under this approach, it will be necessary to ensure Google Earth imagery represent the appropriate timeframe under investigation.

At reporting intervals, activity data will then be adjusted by the average percentage of plantation area that failed, taking into account both ground survey/verification data as well as the Google Earth analyses.

Table 34: CSE Plantation MMR approach for estimating emissions

Parameter:	Area planted under the NFPDP
Description:	Verified area of trees planted under the NFPDP
Data unit:	Area planted (ha)
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	<p>The NFPDP documents annual area planted per forest reserve through national censuses.</p> <p>These censuses verify the area planted by the private developers who have received licenses to engage in plantation establishment in on-forest reserves. These censuses also include data on species planted per reserve and estimate the survival percentage of planted species.</p> <p>Under the MRV programme, it is recommended that these censuses also integrate spatial data on the areas planted within forest reserves. This will allow for the development of a spatial database that will allow for improved mapping and monitoring of planted area during the ER programme.</p>
Frequency of monitoring/recording:	Annual
Monitoring equipment:	GPS units
Quality Assurance/Quality Control procedures to be applied:	Spot-checking. 5% of forest reserves should be re-visited during annual census taking by an independent team to ensure censuses are carried out consistently and accurately.
Identification of sources of uncertainty for this parameter	Survey error
Process for managing and reducing uncertainty associated with this parameter	Survey error
Any comment:	

Table 35: CSE Teak MMR approach for estimating emissions

Parameter:	Removal factor for teak plantations
Description:	Calculated removal factor for carbon stock enhancement through plantation of teak in forest reserves (AGB and BGB). Represents long-term stocks of teak plantations in Ghana.
Data unit:	t CO ₂ /ha
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	Published literature (<u>Adu-Bredu S., et al. 2008⁷⁴</u>) on tree carbon stocks in teak stands in moist evergreen forest in Ghana (98 Mg C ha) Long-term carbon stocks: 98 Mg C ha / 2 = 49 = 179 t CO ₂ /ha
Frequency of monitoring/recording:	Annual
Monitoring equipment:	N/A
Quality Assurance/Quality Control procedures to be applied:	
Identification of sources of uncertainty for this parameter	Key uncertainties in the development of removal factors include sampling error and allometric errors.
Process for managing and reducing uncertainty associated with this parameter	N/A
Any comment:	

Table 36: CSE Non-teak MMR approach for estimating emissions

Parameter:	Removal factor for other broadleaf species planted in NFPDP plantations
Description:	Calculated removal factor for carbon stock enhancement through plantation of broadleaf tree species in forest reserves (AGB and BGB). Represents long-term stocks of broadleaf tree species plantations in Ghana.
Data unit:	t CO ₂ /ha
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific	IPCC AFOLU Vol. 4 table 4.8 above-ground biomass in forest plantations. Values for 'Africa broadleaf >20 years' for three ecological zones in the GCFRP Accounting Area (tropical rain forest, tropical moist deciduous forest, and tropical dry forest) were averaged, and converted to carbon. The belowground biomass value was then generated by applying a root-to-shoot ratio of 0.235 for

⁷⁴ Adu-Bredu S. et al. (2008). Carbon Stock under Four Land-Use Systems in Three Varied Ecological Zones in Ghana. Proceedings of the Open Science Conference on Africa and Carbon Cycle: the CarboAfrica project, Accra, Ghana, 25-27 November 2008

literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	tropical/subtropical moist forest/plantations >125 Mg ha ⁻¹ (Mokany et al.2006) ⁷⁵ . Total tree carbon stocks were then converted to t CO ₂ /ha. <ul style="list-style-type: none"> • Average AGB: 173 t d.m. ha⁻¹ -> 87 t C/ha • BGB: 20 t C/ha • Total = 107 t C/ha • Long-term average: 107 t C/ha /2 = 54 t C/ha = 196 t CO ₂ /ha
Frequency of monitoring/recording:	Annual
Monitoring equipment:	N/A
Quality Assurance/Quality Control procedures to be applied:	
Identification of sources of uncertainty for this parameter	Key uncertainties in the development of removal factors include sampling error and allometric errors.
Process for managing and reducing uncertainty associated with this parameter	N/A
Any comment:	

9.2 Organizational structure for measurement, monitoring and reporting

The country's REDD+ programme is supports a multi-sector approach and is fostering collaboration from multiple institutions across sectors⁷⁶. Ghana's REDD+ strategy⁷⁷, outlines "a governance structure that is horizontally and vertically integrated to include multiple government institutions as well as private sector, civil society, traditional authority, and community representatives; occurring at both national and sub-national levels".

For Ghana's measuring, monitoring and reporting system, the following institutions will be directly involved⁷⁸:

- The Forestry Commission's Climate Change Unit (CCU) / NRS
- Ghana Cocoa Board
- The Forestry Commission's Resource Management Support Center (RMSC)

⁷⁵ Mokany K, Raison R.J, Prokushkin A.S 2006 Critical analysis of root : shoot ratios in terrestrial biomes. Global Change Biol. 12, 84–96. doi:10.1111/j.1365-2486.2005.001043.x.

⁷⁶ Ghana's draft study document envisions "a governance structure that is horizontally and vertically integrated to include multiple government institutions and integrated bodies comprised of government, private sector, civil society, traditional authority, and community representatives; occurring at both national and sub-national levels. It is also focused on the development of new structures and mechanisms, like the MMRV system and an Information Systems, to meet performance based reporting requirements on emissions and safeguards" amongst others.

⁷⁷ Ghana National REDD+ Strategy, 2015.

⁷⁸ GoG, 2015. Development of Reference Emissions Levels and Measurement, Reporting and Verification System in Ghana, Indufor Oy. 2015. FC/FCPF/MRV/REL/RFP/01/2013 Final Report.

- The Forestry Commission's Forest Services Division (FSD)
- ICT Department of the Forestry Commission
- The Energy Commission
- The Environmental Protection Agency (EPA)
- Private Sector, NGOs and Research Institutions
- HIA Consortium/ Governance Body
- Academia

Many of these institutions have clear mandates that will effectively allow them to undertake their specified roles during MMR of programme performance. The specialized departments and units of the Forestry Commission including RMSC, FSD, ICT and the NRS will play significant roles in the collection, analysis and storage of data during the MMR phase. These tasks form an integral component of their expected operational activities. The Forestry Commission and its parent ministry, Ministry of Lands and Natural Resources will also ensure that dedicated funds are set aside to support all the activities envisaged under the MMR and the procurement of relevant software and hardware.

Additionally, the NRS has entered into MOUs with the Environmental Protection Agency (EPA) as well as the Centre of Remote Sensing and Geographic Information System (CERSGIS) for information exchange and technical assistance on forest monitoring and national greenhouse gas inventory processes.

In order to ensure that the institutional architecture is formalized prior to the completion of Ghana's first monitoring cycle by the end of 2017; the NRS intends to conclude MOUs with all the key MMR agencies by the first quarter of 2017. The key objective is to ensure that all relevant institutions fully acknowledge their assigned roles and have adequate capacity to implement.

In formalizing the MMR institutional framework, adequate attention will also be invested towards strengthening the capacity of the identified institutions through targeted training programmes and procurement of required hardware and software. The NRS will identify experts that will serve as resource persons for the training programme.

The rest of this section describes institutional roles and responsibilities and outlines the MMR timeline.

National REDD+ Secretariat

The NRS in collaboration with the PMU is responsible for the overall coordination of the programme's MRV system. All data collected from the institutions listed above will be submitted to the NRS who will house the master MRV Tool.⁷⁹, which will be integrated into the programme's overall data management system. NRS will ensure quality assurance and quality control of the data collected and will also have responsibility for uploading data to the REDD+ Information Database.

As the focal point for REDD+ in Ghana, the NRS will have responsibility for Ghana's reporting obligations on the implementation of the MRV system to the Carbon Fund of the World Bank as well as provide requisite information to the Environmental Protection Agency to support Ghana's communication to the UNFCCC.

⁷⁹ Ghana's MRV Tool is a user friendly Excel based tool with country specific emission factors for each activity reported in the ER-PD. The tool will be updated on a yearly basis by the CCU with data reported to it by the relevant institutions as described in the 'Organizational structure for measurement, monitoring and reporting' section.

The NRS may engage the services of an academic institution e.g. KNUST for uncertainty assessment during the monitoring period.

Environmental Protection Agency

The EPA houses the National Climate Change Data Hub, as described under Section 18. The NRS will submit GHG emission estimates from the forestry sector to the EPA for national reporting to the UNFCCC. The EPA reports to the Ministry of Environment, Science, Technology and Innovation.

Resource Management Support Center

RMSC will play an overarching role in data collection and design for all forest related parameters in close collaboration with district and regional offices of the Forest Services Division (FSD). All raw data will be handled, stored and backed up by RMSC.

The specific responsibilities of RMSC during the Measurement, Monitoring and Reporting (MMR) phase of the programme include the following:

- **Acquisition of Remote Sensing data and generation of spatial activity data (SOP included in Annex 9):** This activity will include procurement of the requisite imagery, pre-processing, classification, change detection and accuracy assessment. These processes will facilitate the generation of activity data for assessment of deforestation trends and their associated emissions. RMSC will work closely with the Forest Services Division for the collection of field data for training and accuracy assessment of the classification. In addition, RMSC will utilize the General Automated Remote Sensing Classification Tool for generation of maps for distinguishing agricultural tree crops from forests.
- **Possible refinement of emission factors for deforestation:** Post and pre-deforestation carbon stocks for the different forest types and strata utilized in estimating historical emissions from deforestation during the reference period were mainly derived from results of the forest biomass mapping and inventory process completed under the Forest Preservation Programme (FPP). It is envisaged that these carbon stock estimates will be utilized during the early period in the monitoring phase (i.e. during the term of the ER-PA). However, should a strong justifiable reason emerge for revision of the carbon stocks, RMSC will play a leading role in collecting data from Sample plots for generating revised carbon stock estimates.
- **Data on timber volumes extracted for degradation measurement:** RMSC periodically collates timber volumes legally harvested from each forest district in Ghana. During the monitoring period, RMSC will be responsible for providing annual data on timber volumes extracted per species and per ecological zone. This data will serve as the activity data for determining emissions from degradation by legal logging.
- **Possible refinement of emission factors for degradation:** Nationally specific factors for ELE, LDF and LIF were developed for Ghana for the reference level estimation. If harvesting practices are significantly altered, RMSC will collaborate with the NRS for re-estimation of the EF parameters.
- **QA/ QC:** RMSC will undertake QA/ QC on data collected by FORIG (illegal logging data) and Energy Commission (woodfuel data)
- **Estimation of degradation by Fire:** RMSC will acquire and process MODIS data for generation of emissions from degradation by fire.
- **Spatial data on carbon stock enhancement (CSE) in on-reserve areas:** RMSC will provide spatial data on plantation establishment in forest reserves for CSE monitoring.

Forest Services Division (FSD)

FSD's Plantations Department will track the activity data needed for emission removals from enhancement activities. The department, along with RMSC's plantation department, has developed Excel-based tools to track data outlined in the enhancement section above. Again, this data will be shared with the Climate Unit for direct input into the MRV Tool.

Data on legal timber extracted is collected through the Tree Information Forms (TIFs), which record estimate of the bole volume (m³) of timber trees extracted from both on and off-reserve areas. The records are captured and submitted by FSD's District Offices on a quarterly basis and serve as the basis for activity data for legal timber harvest. The regional offices will coordinate the raw data collection including QA/QC, data compilation and submission to RMSC. These data will be collated in excel format and submitted to the CCU on an annual basis for entry into the MRV tool. FSD will also support RMSC for the collection of data for training and accuracy assessment of the classification of land use/ cover maps.

Energy Commission

The Energy Commission collects data that provides estimates on woodfuel sources and consumption that will be collated and can be shared with the NRS to update data for the MRV.

ICT Department of the Forestry Commission

The ICT Department will provide a supporting role in storing all data, providing backups of data and advising on the procurement of any ICT software and equipment.

Research & Academia

Research organizations such as FORIG, CERSGIS and relevant departments from the universities (e.g. Maths Department of the Kwame Nkrumah University of Science and Technology) will provide support on monitoring, measurement and reporting , as needed. More specifically:

- CERSGIS will undertake QA/ QC on the development of land use/ cover maps for deforestation change detection as well as analysis of MODIS data carried out by RMSC to generate estimates of emissions from degradation by fire.
- FORIG will be responsible for collecting data on illegally harvested timber supplied to the timber market which will be utilized for the generation of activity data for degradation by illegal logging. FORIG will also support CERSGIS to undertake QA/ QC on the generation of emission estimates from degradation by fire using MODIS.
- The Maths Department will perform the uncertainty assessments of the different activities (deforestation, degradation and CSE).

Private Sector

The private sector particularly those involved in the cocoa value chain and leading HIA Consortiums will be a good source of data from their programmatic interventions. These data may include spatial/ ground data on enhancement activities being undertaken in cocoa plantations, mapping of cocoa farms, and data on illegal activities.

NGOs

NGOs will play an essential role in the MMR process by sharing any valuable data from their engagement in HIA Consortiums and implementation of programme activities with the NRS. They can also provide support in the dissemination of results from the measurement and monitoring to key local stakeholders including the Governance Bodies leading the HIA landscapes and associated communities.

The MRV sub-working group

The multi-stakeholder MRV sub-working group (one of the thematic REDD+ technical working groups) will support the NRS to undertake assessment of outputs received from the various institutions whilst supporting efforts towards information sharing with relevant agencies. Additionally, the sub-working group will support CERSGIS to undertake QA/ QC of the development of landuse/ landcover maps and associated change detection approaches.

Annex 12 provides further detail on capacity building activities undertaken and planned to ensure that the institutions referred to above receive the necessary support.

Table 37: Institutions involved in Ghana MMR and their specific roles and responsibilities

MMR Institutions	Main Roles and Responsibilities
Ministry of Lands and Natural Resources (MLNR)	The sector ministry to which the Forestry Commission reports. Responsible for Ghana's Forest Investment Programme (FIP) and will serve as the programme's Coordination and Management Committee to ensure integration with FIP projects and related activities. The MLNR will also provide financial support for operationalizing the MRV
Forestry Commission (FC)	Allocate funding to support monitoring activities
Districts and Regions of the Forest Services Division FSD, of the FC)	Provide data on on-reserve CSE activities and legal timber harvest to RMSC; Support RMSC to collect field data for classification and accuracy assessment.
National REDD+ Secretariat	Overall coordination of the MMR processes <ul style="list-style-type: none"> - Reports to the Carbon Fund - Reports to the EPA
Resource Management Support Centre (RMSC, of the FC)	Technical lead for collection of field data and analysis of spatial data to generate emissions estimates
Forestry Research Institute of Ghana (FORIG)	Support with collection of data on illegally harvested timber; Develop/ refine allometric equations for carbon stocks estimation in various strata/ forest types.
Soil Research Institute (SRI)	Estimation of forest carbon
Center for Remote Sensing & Geographic Information Services (CERSGIS), University of Ghana	QA/ QC of maps
Environmental Protection Agency (EPA, under MESTI)	The National Focal Point for Climate Change and is responsible for the National Communications to the UNFCCC
Ghana Energy Commission (under MOE)	Collection of woodfuel data
Ghana Cocoa Board (COCOBOD)	Provide relevant data on CSE activities being undertaken in cocoa farms
HIA Consortium/ Governance Board	The HIA Consortium and Governance Board will constitute the implementing partners and governance body respectively for the GCFRP. These bodies will play a key role in facilitating the work of relevant institutions involved in the collection of data at the decentralized levels of the programme area i.e. district and community levels.

Figure 16 below, outlines the overall structure of the MRV mechanisms for Ghana, and Table 37 describes institutional roles.⁸⁰ Table 38 provides a detailed outline of the MMR timelines.

⁸⁰ Figure updated from Indufor Oy. 2015. Development of Reference Emissions Levels and Measurement, Reporting and Verification System in Ghana FC/FCPF/MRV/REL/RFP/01/2013 Final Report.

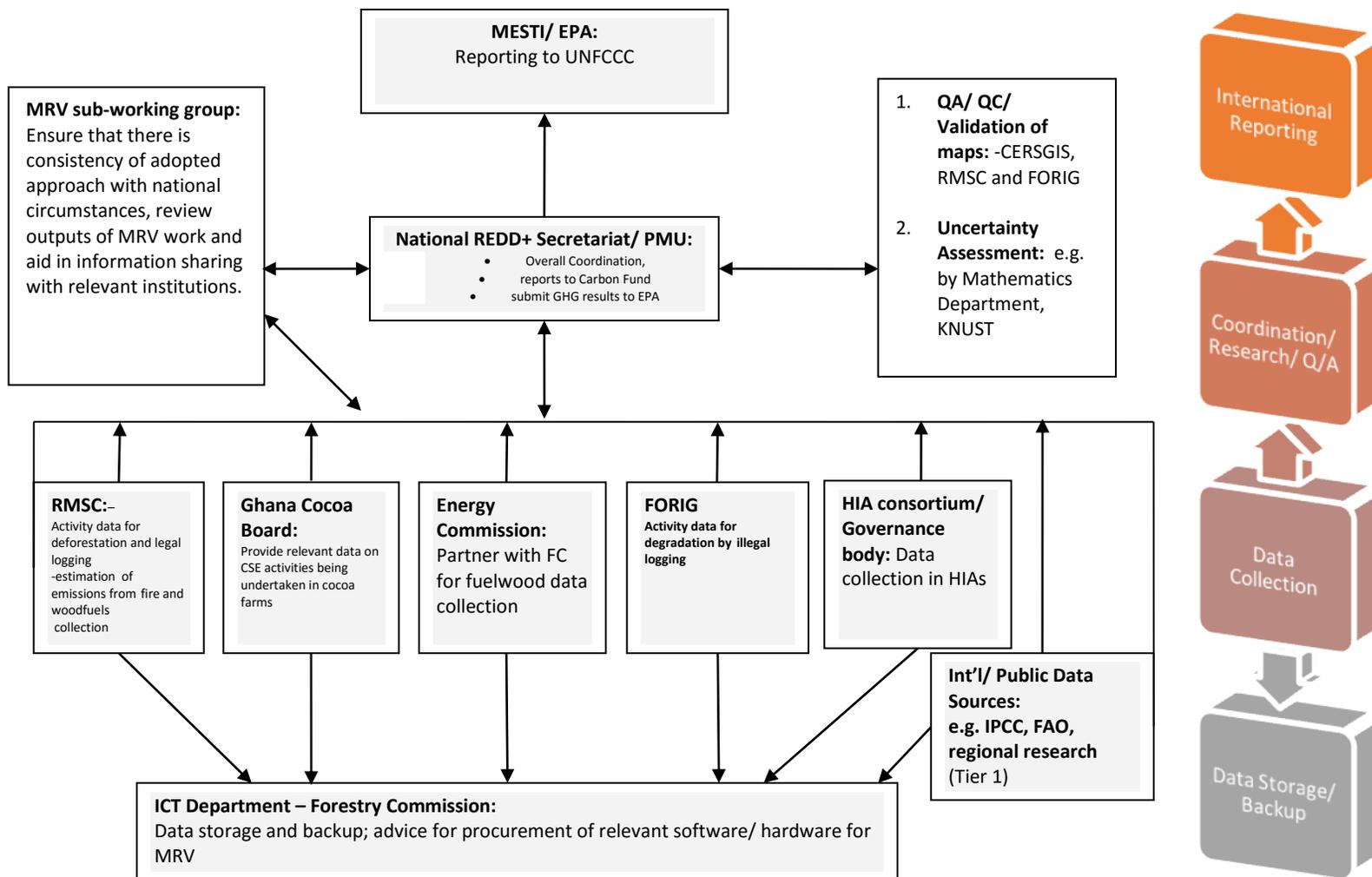


Figure 16: Overall institutional structure of Ghana's MRV mechanism.

Table 38: NRS MMR Timeline

ACTIVITIES	Monitoring period											
	First quarter			Second quarter			Third quarter			Fourth quarter		
General activities												
Finalize/ update MOUs with key institutions	■	■	■									
Procure hardware/software and renew licenses	■	■										
Capacity building				■								
Deforestation												
Satellite image acquisition			■									
Collection of training data set for classification			■	■								
Image processing and classification				■	■	■						
Estimations of activity data and emission factors								■	■			
QA/QC			■	■	■	■	■	■	■			
Degradation												
Acquisition of MODIS data for fire analysis			■	■								
Application of WISDOM Model for woodfuel			■	■								
Compiling of legal timber harvest volumes from districts		■	■									
Data collection, processing and analysis of illegal timber harvest		■	■					■	■			
QA/QC		■	■	■	■	■	■	■	■			
Carbon Stock Enhancement												
Data collection of area planted and survival rates									■	■		
Analysis of CSE											■	
QA/QC									■	■	■	
Reporting												
Review and validation of results by MRV sub-working group											■	
Submission of results to Carbon Fund												■
Submission of results to EPA												■

9.3 Relation and consistency with the National Forest Monitoring System

Under the Forestry Commission, the data necessary to estimate emission and removals from enhancements, deforestation and degradation from timber harvest (legal and illegal) as well as fire are collected at the national level and are continuously being improved on a step-wise basis.

These data serve as the basis of Ghana’s National Forest Monitoring System (NFMS), which is consistent with IPCC guidelines for forest monitoring, and were used to estimate the reference level for the ER-Programme. These methods will be followed in data collection for the measurement and reporting of Ghana’s emissions as well. The ER-programme is consistent with the NFMS with the exception of woodfuel.

Currently data on woodfuel are collected by the energy commission and these data will serve as the data used in the MRV period, which will be included in the NFMS. However, to estimate emissions for the Reference Level, the data was based on the WISDOM model as explained in the reference level section. For future monitoring of woodfuel emissions, Ghana will explore the adaptability of WISDOM into their NFMS (see Annex E for Stepwise Improvements to data collection for woodfuel emissions estimates).

10. DISPLACEMENT

10.1 Identification of the risk of Displacement

*Using the table below and building on the analysis in sections **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**, please assess the risk for Displacement of emissions from the ER Programme Accounting Area to areas outside the Accounting Area as a result of the proposed ER Programme Measures.*

*Refer to **critterion 17, indicator 17.1** of the Methodological Framework*

The programme’s displacement risk is judged to be low to medium. The logic of designing a program that aligns with the ecological boundaries of key commodities and drivers was an intentional effort to minimize the likelihood of the displacement of activities and emission leakages.

Table 39: Displacement risks associated with different drivers of deforestation

Driver of deforestation or degradation	Risk of Displacement. (Categorize as High, Medium or Low)	Explanation / justification of risk assessment
Cocoa farming	Low	Agents are not migrating out of the activity area to plant cocoa in other localities due to ecological limitations of cocoa trees, which do not do well outside the programme’s boundaries. The threats from a changing climate and its impacts on cocoa production outside the recommended growing areas further reduces the likelihood of displacement. In addition, given that cocoa farmers and farming

		communities will be directly engaged in the programme interventions and receiving associated benefits, there should be little incentive to move outside the program.
Subsistence agriculture	Low	Most food crops grown in the programme area are also constrained by the same ecological limits (e.g. plantation, cocoa yam) as cocoa trees. The food crops are also inter-cropped with cocoa or grown on adjacent lands by the same cocoa farmers, reflecting a diversified farming system that is not easily displaced outside the landscape. These same farmers will also be receiving benefits from the programme. Therefore, the food crop “agents” are not likely to be migrating out of the activity area .
Illegal logging	Medium	The programme holds the majority of the timber resources being logged illegally for building and construction purposes. Sources of timber outside of the programme’s ecological boundaries are less abundant. The illegal logging that has dominated in the north is particularly focused on rosewood, which is sought by Asian markets. But the north of the country is not a significant source of the illegal supply of domestic timber. A significant increase in monitoring by stakeholders at the scale of HIAs and through rapid response to other hotspots will reduce the incidence and opportunity. The FC’s focus on scaling up plantation development with the private sector will be able to serve as the main source of the domestic supply, reducing the demand from illegal sources. Through the development of jobs from the plantation industry and the Cocoa Board’s focus on Youth in Cocoa, the agents (chainsaw operators) will also have new livelihood opportunities.
Illegal small-scale mining	Medium	Ghana’s gold belt is not equally present across the entire country. The dominant gold vein is situated within the programme area, crossing down from centre of the landscape to the southwest, though it is recognized that gold deposits are located outside the programme area in some places. In addition, the land owners are not migratory, only some of the agents. Increased income from climate-smart agriculture and other benefits are expected to help mitigate the opportunity cost of abandoning illegal mining for local agents. Finally, the decreasing price of gold is expected to reduce the demand more generally.

10.2 ER Program design features to prevent and minimize potential Displacement

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*Please identify possible risk mitigation strategies associated with each of the risks identified in section **Error! Reference source not found.** above. Describe the strategy to mitigate and/or minimize, to the extent possible, potential Displacement, prioritizing the key sources of Displacement risk and justifying how this strategy can impact the Displacement risk ratings.*

*Refer to **critterion 17, indicator 17.2** of the Methodological Framework*

As stated above, the logic of designing a program that aligns with the ecological boundaries of key commodities and drivers was an intentional effort to minimize the likelihood of displacement of the

main drivers and associated emission leakages. Therefore, the does not expect to cause any significant displacement (leakage) outside its boundaries, as the programme interventions are directly focused to address two of the main drivers and agents of deforestation and degradation in the region (cocoa/subsistence farming and unsustainable logging), providing them with permanent climate-smart agriculture options. Furthermore, the programme drivers and agents are not relevant outside of the programme area, with the exception of illegal mining. For example, the ecological limits of the HFZ and that of the agricultural products grown in the programme area, including cocoa, conform to the programme's ecological boundaries. Thus, expansion of cocoa, food crops, or other tree crops outside the programme area is highly unlikely, especially with the increasing threat from climate change. Therefore, the selection of the programme's boundaries along the ecological zone represents a key leakage avoidance strategy.

Despite the low risk, the potential displacement of deforestation and degradation will be monitored annually across the programme area and its surroundings. If displacements are identified and attributed to the programme, they can be deducted/compensated with reductions in future ERs generated by the programme.

Displacement monitoring will include ongoing assessments within and outside the program boundaries of:

- Cocoa plantation establishment
- Legal and illegal timber volumes
- Deforestation associated with mining

Displacement of cocoa leading to deforestation outside programme boundary:

Displacement through cocoa plantation establishment outside the accounting zone and within forests is a highly unlikely possibility as the program has been designed to cover the majority of the cocoa growing area of Ghana, and thus planting cocoa outside the programme area would be to plant in a place where production is ecologically unsuitable. The Volta Region is the only possible area where this could theoretically happen, but is also unlikely given that it is the lowest production region in the country and migrations to VR for cocoa cultivation are very low due to cultural / ethnic differences and challenges in accessing land. Nonetheless, Cocoa Board and key private sector partners and Forestry Commission staff will monitor for such displacement on the ground, and the NFMS will be able to pick up deforestation driven by cocoa and other drivers outside the accounting area.

Displacement of legal and illegal logging outside GCFRP area:

Legal and illegal timber volumes will be monitored outside the accounting area through the NFMS and the forestry commission check points that control and monitor the supply and transportation of timber across the country. Data acquired from the offices of the forest services division will provide guidance on timber felling outside the accounting areas to monitor whether legal timber felling has increased in such areas as REDD+ implementation has limited the felling within the accounting area.

Displacement of mining outside the GCFR area:

The NFMS will be able to identify deforestation driven by mining outside the programme area during the national monitoring activities, and as new ER programmes are implemented. Increased engagement with the Minerals Commission will also enable monitoring of illegal mining that may have been displaced by the programme area.

As implementation progresses, there will be other programs within other ecological zones where monitoring will also prevent leakage of drivers from the GCFRP accounting area into such ecological zones

The risk of international displacement of emissions (leakage) is not considered to be a problem for this programme given that Ghana does not have jurisdiction over other sovereign states. More practically, however, the boundaries between Ghana and Côte d'Ivoire (the only likely border for international leakage) are monitored closely, making it difficult for people to migrate seamlessly or to transfer products like timber or cocoa beans. Moreover, the factors driving deforestation in Ghana, including agricultural expansion, could not shift onto Ivorian soil without encountering significant barriers or consequences. Finally, Ghana is a member of the UNFCCC, and is closely watching decisions on international leakage and will conform as needed or as necessary.

11. REVERSALS

11.1 Identification of risks of Reversals

There are several risk factors that can cause reversals, as identified in the ER Buffer Programme Guidelines developed by the FCPF. Table 16 below explains in more detail these factors and the risk associated with them.

Table 40: Identified factors of Risk of Reversal

Risk Factor	Level of reversal risk ⁸¹	Justification
Default Risk	10%	Not applicable
A. Lack of broad and sustained stakeholder support	Low 10% - 10% = 0%	There is low stakeholder risk as the programme has clearly identified its main stakeholders and a high degree of formal and informal consultation has been completed during design. Extensive further consultation in each HIA will continue during early implementation. The in-depth inclusion, as part of the design, of cocoa farmers, their rural communities, women, and the private sector and farmer associations, and the HIA-Consortium structure will ensure a high degree of buy-in. This risk would increase if there was lack of sufficient consultation and awareness creation on the basics of the programme and implementation plan. This risk will continue into early implementation phase when the hotspots areas engagement begins. In order to mitigate this, establishment of HIAs should be preceded by broad community consultation involving all stakeholders, especially traditional authorities, community elders, and other key persons to increase ownership, inclusiveness, avoid disappointment and ensure sustainability while garnering broad community support. This will be buttressed by the implementation of

⁸¹ The percentages represent the portion of the ERs to be set aside in a buffer reserve. The figures are based on the guidelines from the FCPF ER Programme Buffer Guidelines.

		safeguards and grievance redress mechanisms under the programme.
B. Lack of institutional capacities and/or ineffective vertical/cross sectoral coordination	Medium: 10% - 5% = 5%	The risks associated with institutional capacity for implementation and sustainability are listed as medium. At the start of REDD+ in Ghana, institutional capacity was low, but capacity has been strengthened through numerous trainings and workshops, and Ghana's capacity to implement this programme has improved. In the past, there has been weak cross-sectoral coordination amongst the lead institutions, but this is also changing, as evidenced by the coordination required to design this programme and in the design and implementation of the FIP. Still, the complexity of the institutional and implementation arrangements for coordinating, verifying, receiving and disbursing ER payments at a programmatic scale of this size is a potential risk for the GCFRP success. Overall, the coordination across natural resource-related agencies (environment, forestry, agriculture, cocoa, water, minerals, and energy) at the local and national levels combined with: (i) the complexity of monitoring requirements for performance-based carbon finance; and (ii) the complexity of orchestrating hundreds of thousands of land-users to act toward common goals of forest conservation and climate-smart cocoa agriculture is acknowledged to be a medium risk. The mitigation of the risk will depend on the identification and effective implementation of measures to strengthen the capacity of participating institutions, carry out joint annual work planning and budgeting across sectors for GCFRP, enhance safeguards implementation, and ensure the timely performance and delivery of operational and coordination requirements. The programme's strategy to focus interventions in decentralized deforestation hotspots will prove an excellent opportunity to build measures to mitigate implementation risks.
C. Lack of long term effectiveness in addressing underlying drivers	Medium 10% - 5% = 5%	The programme interventions are directly focused to address two of the main drivers and agents of deforestation and degradation in the region (cocoa/subsistence farming and unsustainable logging). The risks from cocoa farming and subsistence agriculture are low because agents are not migratory and will be directly engaged in the programme interventions. The risk from illegal logging is considered medium. The programme holds the majority of the timber resources being logged illegally for building and construction purposes. Sources of timber outside of the programme's ecological boundaries are quite limited. A significant increase in monitoring by stakeholders at the scale of HIAs and through rapid response to other hotspots will reduce the incidence and opportunity. Agents will be directly engaged in the programme interventions. The risk from illegal small-scale mining is also considered medium. The land owners are not migratory, though some of the agents are. In the second phase of the programme (post-2020), lessons from the HIAs will be applied to areas with illegal mining. Increased income from climate-smart agriculture and other benefits will help to mitigate the opportunity cost.
D. Exposure and vulnerability to natural disturbances	Low 5% - 5% = 0%	This risk is considered as low. The main natural risk in the GCFRP accounting area are forest fires. The use of fire for forest clearing is illegal in Ghana, but the occurrence of uncontrolled forest fires may happen as a result of illegal practices related to illegal logging, land clearing, charcoal production, and as a result of dry years (El Nino events). The programme will mitigate this risk of forest fires by further strengthening fire management and control units at Forestry Commission, district

		assemblies, fire volunteers etc. The programme’s MRV system will help to identify forest fires almost in “real time” and the improved structure for surveillance and fire brigades will allow for immediate reaction. Better land use planning and reductions in illegal logging will also ensure healthy forests which are less susceptible to fires.
Total risk of reversals = 10% + 0% + 5% + 5% +0% = 20%		

11.2 ER Program design features to prevent and mitigate Reversals

*Please identify possible risk mitigation strategies associated with each of the risks identified in section **Error! Reference source not found.** above. Describe how the ER Programme design and implementation will contribute to the mitigation of significant risks of Reversal, and will address the long term sustainability of its Emission Reductions, both during the Term of the ERPA and beyond the Term of the ERPA.*

*Refer to **critterion 18, indicator 18.2** of the Methodological Framework*

Illegal Mining:

The Minerals Commission and National Security bodies will be the key institutions in mitigating risk from this issue. It is also assumed that landscape planning will address some of the socio-cultural issues driving illegal mining. There is already strong evidence in Western Region (Wassa Amenfi West and Wassa Amenfi Central districts) that community-based management and planning approaches can significantly reduce the incidence of mining. In the second phase of the programme (post-2020), lessons from the HIAs will be applied to areas where illegal mining is a major problem. Increased income from climate-smart agriculture and other benefits will help to mitigate the opportunity cost and threat of reversal.

Commodity Price Volatility:

Ghana’s Cocoa Board regulates the price of cocoa in Ghana, which therefore moderates potential future price volatility affecting farmers’ decision making. However, it will be important to make sure that the appropriate resources are in place to foster long-term tree-crop farming systems in appropriate lands. To avoid and monitor this risk, the programme will register all farms included in the programme and monitor if the intensified crops are profitable enough to sustain their social needs.

Forest Fires:

The programme will mitigate this risk of forest fires by further strengthening fire management and control units at Forestry Commission. The programme’s MRV system will help to identify forest fires almost in “real time” and the improved structure for surveillance and fire brigades will allow for immediate reaction. Better land use planning and reductions in illegal logging will also ensure healthy forests which are less susceptible to fires.

11.3 Reversal management mechanism

Selection of Reversal management mechanism

Table 41: Reversal management Mechanism

Reversal management mechanism	Selected
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	(Yes/No)
Option 1: The ER Programme has in place a Reversal management mechanism that is substantially equivalent to the Reversal risk mitigation assurance provided by the ER Programme CF Buffer approach	
Option 2: ERs from the ER Programme are deposited in an ER Programme -specific buffer, managed by the Carbon Fund (ER Programme CF Buffer), and based on a Reversal risk assessment.	Yes

Ghana proposes to use the Buffer ER Carbon Fund Programme to store credit risk associated with uncertainty and reversals. The manner in which the amount of credits from emission reductions will be determined in the buffer is explained in "ER Buffer Programme Guidelines" developed by the FCPF. Specifically, for rollbacks, we plan to use the risk assessment tool reversions that requires a specific amount to put in the buffer for each risk factor. The Table 16 has more details about these factors and the proportion proposed as an internal risk assessment.

Ghana will also keep its own record of credits associated with emissions reductions and other ecosystem benefits. This national registry will serve to integrate all environmental services in the country and avoiding double-accounting between various schemes and programmes to promote and pay for performance. Thus it will be possible to ensure that appropriations made in the buffer Carbon Fund are not committed to another programme.

11.4 Monitoring and reporting of major emissions that could lead to Reversals of ERs

Emissions that would lead to reversal will be tracked through the monitoring of activities. This will also hold true for removals from enhancements as Ghana moves towards monitoring this activity spatially. Immediate monitoring for the sake of rapid response and communication with the World Bank will be conducted through global rapid alert databases including WRI's Global Forest Watch.

12. UNCERTAINTIES OF THE CALCULATION OF EMISSION REDUCTIONS

12.1 Identification and assessment of sources of uncertainty

Please systematically identify and assess sources of uncertainty associated with calculation methods that contribute to the uncertainty of the estimates of emissions and removals and assess their relative contribution to the overall uncertainty of the emissions and removals.

*Refer to **critterion 7** of the Methodological Framework*

The key sources of uncertainty are identified below and summed across emission/removal factors and activity data (within strata). Summation of errors follows the propagation of errors approach described

in equations 3.1 and 3.2 of the IPCC (2006) (equations 12.1 and 12.2 respectively). Errors were weighted (Eq. 12.2) where errors were propagated for parameters with the same units of measurement.

$$U_{total} = \sqrt{U_1^2 + U_2^2 + \dots + U_n^2} \quad \text{Eq. 12.1}$$

(Eq. 3.1 of the IPCC (2006))

Where:

U_{total} = percentage uncertainty of the product of quantities (half the 90% confidence interval, divided by the total and expressed as a percentage);

U_i = percentage uncertainty associated with each of the quantities.

$$U_{total} = \frac{\sqrt{(U_1 * x_1)^2 + (U_2 * x_2)^2 + \dots + (U_n * x_n)^2}}{|x_1 + x_2 + \dots + x_n|} \quad \text{Eq. 12.2}$$

(Eq. 3.2 of the IPCC (2006))

Where:

U_{total} = percentage uncertainty of the sum of quantities (half the 95% confidence interval, divided by the total (i.e. the median) and expressed as a percentage). The term “uncertainty” is based on the 95% confidence interval

x_i y U_i = absolute uncertainty and associated percentage uncertainties, respectively.

Details of analyses are given in the accompanying spreadsheets. Source uncertainty parameters are given in the spreadsheets and in Section 8.

Table 42: Assessment of identified sources of uncertainty

Activity	Sources of Uncertainty	Summed Uncertainty				
Deforestation	Uncertainty in remote sensing of land cover maps as identified in the confusion matrices Sampling uncertainty for the measurement data for emission factors ⁸²	Forest carbon Stratum/ Forest type	Post deforestation Stratum		Uncertainty (%)	
		Wet evergreen				
		Closed forest	Cropland	Cropland (herbaceous and fallow land)		21.4
				Plantations	Oil Palm	27.1
					Citrus	32.1
					Rubber	40.0
					Cocoa	19.9
		Grassland			19.4	
		Wetlands			26.8	
		Settlement			17.4	

⁸² Spreadsheets show calculation of uncertainty across pools for the emission factors. Combination with activity data relies of the 84% accuracy of classification (thus 16% uncertainty)

		Bareland/other		24.1
Open Forest	Cropland	Cropland (herbaceous and fallow land)		32.8
			Plantations	Oil Palm
		Citrus		66.0
		Rubber		72.3
		Cocoa		40.0
	Grassland		16.9	
	Wetlands		39.9	
	Settlement		16.0	
	Bareland/other		39.7	
	Moist Evergreen			
Closed forest	Cropland	Cropland (herbaceous and fallow land)		18.2
			Plantations	Oil Palm
		Citrus		27.8
		Rubber		35.1
		Cocoa		17.9
	Grassland		16.8	
	Wetlands		17.2	
	Settlement		16.3	
	Bareland/other		18.9	
	Open Forest	Cropland	Cropland (herbaceous and fallow land)	
Plantations				Oil Palm
			Citrus	53.8
			Rubber	62.0
			Cocoa	35.5
Grassland			30.9	
Wetlands			44.3	
Settlement			21.1	
Bareland/other			37.3	
Moist Semi-deciduous SE				
Closed forest	Cropland	Cropland (herbaceous and fallow land)		18.1
			Plantations	Oil Palm
		Citrus		28.3
		Rubber		35.8
		Cocoa		17.9
	Grassland		17.0	
	Wetlands		20.0	
	Settlement		16.6	
	Bareland/other		18.4	
	Open Forest	Cropland	Cropland (herbaceous and fallow land)	

		Plantations	Oil Palm	45.4	
			Citrus	52.7	
			Rubber	61.0	
			Cocoa	24.0	
		Grassland		31.4	
		Wetlands		39.9	
		Settlement		23.4	
		Bareland/other		34.9	
Moist Semi-deciduous NW					
Closed forest	Cropland	Cropland (herbaceous and fallow land)		20.1	
			Plantations	Oil Palm	40.0
				Citrus	48.1
				Rubber	57.3
				Cocoa	20.9
		Grassland		16.9	
		Wetlands		18.9	
		Settlement		16.2	
		Bareland/other		22.6	
Open Forest	Cropland	Cropland (herbaceous and fallow land)		23.4	
			Plantations	Oil Palm	58.2
				Citrus	65.2
				Rubber	71.7
				Cocoa	29.4
		Grassland		20.0	
		Wetlands		24.8	
		Settlement		16.6	
		Bareland/other		30.0	
Upland Evergreen					
Closed forest	Cropland	Cropland (herbaceous and fallow land)		26.0	
			Plantations	Oil Palm	33.7
				Citrus	39.2
				Rubber	47.3
				Cocoa	23.1
		Grassland		27.8	
		Wetlands		30.7	
		Settlement		21.1	
		Bareland/other		29.7	
Open Forest	Cropland	Cropland (herbaceous and fallow land)		28.2	
			Plantations	Oil Palm	48.5
			Citrus	56.2	
			Rubber	64.4	
			Cocoa	36.2	

			Grassland	21.7	
			Wetlands	45.9	
			Settlement	17.6	
			Bareland/other	36.3	
Legal Timber Harvest	Sampling uncertainty for emission factors	5.7%			
Illegal Timber Harvest	Sampling uncertainty for estimates of illegal logging volumes. Sampling uncertainty for emission factors	53%			
Woodfuel	Sampling uncertainty for woodfuel supply volumes. Model uncertainty for woodfuel demand volumes	50%			
Fire	Uncertainty resulting from the coarseness of MODIS data Uncertainty from the IPCC default factors Sampling uncertainty for emission factors	Forest carbon Stratum/ Forest type	Uncertainty %		
			Wet evergreen		
		Closed Forest		CO ₂	38.4
				CH ₄	48.0
				N ₂ O	107.0
		Open Forest		CO ₂	36.7
				CH ₄	46.7
				N ₂ O	106.4
		Moist Evergreen			
		Closed Forest		CO ₂	37.0
				CH ₄	46.9
				N ₂ O	106.5
		Open Forest		CO ₂	45.6
				CH ₄	54.0
		N ₂ O	109.8		
Moist Semi-deciduous SE					

		Closed Forest CO ₂ 37.1 CH ₄ 47.0 N ₂ O 106.5 Open Forest CO ₂ 46.7 CH ₄ 54.9 N ₂ O 110.2 Moist Semi-deciduous NW Closed Forest CO ₂ 36.9 CH ₄ 46.8 N ₂ O 106.4 Open Forest CO ₂ 38.4 CH ₄ 48.0 N ₂ O 107.0 Upland Evergreen Closed Forest CO ₂ 43.8 CH ₄ 52.4 N ₂ O 109.0 Open Forest CO ₂ 39.7 CH ₄ 49.1 N ₂ O 107.4	
Enhancement	Sampling uncertainty for removal factors	Teak: 6% Other: 33%	

12.2 Quantification of uncertainty in Reference Level setting

Details of uncertainty quantification methods are given under the relevant section for each activity in [Section 12.3](#). Summation of uncertainties was a propagation of error approach with weighting.

Table 43: Quantification of Reference Level Uncertainty

Activity	Uncertainty
Deforestation	5.4%
Legal Timber Harvest	5.7%
Illegal Timber Harvest	53.0%
Woodfuel	50.0%
Fire	23.0%
Enhancement	20.27%
Total	7.6%

Total uncertainty for the reference level is 7.6% (uncertainty as a percentage of the mean). This is predominantly determined by the dominance of emissions from deforestation (76%).

12.3 How uncertainties will be reduced

Uncertainty in deforestation emissions are low and further meaningful reduction through MRV changes may be minimal. However, the ER program implementation will include assessment of activity data with confusion matrices and updating of emission factors with continuous field data collection.

Uncertainty in legal timber harvest is equally low through excellent field data collection by the Forestry Commission and activity data through national statistics. The Forestry Commission intends to keep up the effective collection of field data on legal harvesting with the implementation of Wood Tracking System as an improvement over the paper based tracking of wood from forest to market.

In contrast, the uncertainty in illegal logging emissions is high due to the use of proxy. This uncertainty will be reduced through a specific monitoring program capturing annual activity data. A systematic approach of collecting data on illegal timber harvest is being strengthened by the Forestry Commission to collate annual timber harvested illegally. This is with the objective of moving away from the use of proxy to a national data source approach. This will be test and rolled out in the programme area. In addition, HIA consortiums and HIA governance board can support Forestry Commission in monitoring within their boundaries and develop indicators for the data management system.

Fuelwood emissions, while a very small proportion of total emissions (2%) are also highly uncertain, predominantly because they result from an analysis at a single point in time. Uncertainty will be reduced through implementation of the MRV plans. This plan includes the tracking of volumes of fuelwood collected from on and off reserves by Forestry Commission through issuing permits to prospective fuelwood extractors.

Fire emissions for the program region are even less significant than those from fuelwood (just 0.13 % of total emissions). As such the 23% uncertainty is considered reasonable. However, efforts at discouraging slash and burn farming practices and the retention of trees on farms within the cocoa landscape in particular during ER program implementation are major steps towards reduction of emissions from fire.

Uncertainty in sequestration will be reduced through implementation of the MRV system and in particular the development of new removal factors for non-teak tree plantations.

13. CALCULATION OF EMISSION REDUCTIONS

13.1 Ex-ante estimation of the Emission Reductions

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Using the table below, please provide a simplified ex-ante estimation of the expected Emission Reductions of the ER Programme within the Accounting Area based on the approach outlined in the FCPF Carbon Fund Methodological Framework. Where the calculation requires monitored data that is not available yet, use best estimates based on expected impacts of the ER Programme and data that might be available from other actions

(either in the country or in other countries). List all assumptions, and provide the values used for each parameter and the sources for these data.

Refer to **critterion 22** of the Methodological Framework

The GCFRP will focus on reducing emissions from deforestation to achieve the greatest impact, as deforestation represents the large source of emissions across the accounting area. Annually an estimated 1,200,000 tCO_{2-e} will be reduced from deforestation, 100,000 tCO_{2-e} from forest degradation and an increase of 50,000 tCO_{2-e} in carbon stock enhancement.

As detailed in the Reversals chapter, 20% of emission reductions are retained in a reversals buffer account.

Table 44: Ex-ante estimation of ERs from the ER Programme

ERPA term year t	Reference level (tCO _{2-e} /yr)	Estimation of expected emissions under the ER Programme (tCO _{2-e} /yr)	Estimation of expected set-aside to reflect the level of uncertainty associated with the estimation of ERs during the Term of the ERPA (tCO _{2-e} /yr)	Estimated Emission Reductions (tCO _{2-e} /yr)
1	45,895,765	44,545,765	292,500	1,350,000
2	45,895,765	44,545,765	292,500	1,350,000
3	45,895,765	44,545,765	292,500	1,350,000
4	45,895,765	44,545,765	292,500	1,350,000
5	45,895,765	44,545,765	292,500	1,350,000

†Given the 5.4% uncertainty for deforestation the conservativeness factor, according to the Methodological Framework, is 0% for deforestation so there is no uncertainty buffer set-aside. For degradation the uncertainty set-aside is 15% as detailed under Criterion 22.2. For enhancement a 15% uncertainty set-aside is also added.

The GCFRP expects to generate 1,350,000 tCO_{2-e} per year over the 5 year ERPA term of the programme, totaling 6,750,000 tCO_{2-e} over the 5 year ERPA, of which 1,462,500 tCO_{2-e} will be set-aside in uncertainty and reversal buffers and 1,057,500 tCO_{2-e} per year will be available for sale.

14. SAFEGUARDS

14.1 Description of how the ER Program meets the World Bank social and environmental safeguards and promotes and supports the safeguards included in the UNFCCC guidance to REDD+

>>

Please describe how the ER Programme, through its design and implementation, meets relevant World Bank social and environmental safeguards, and promotes and supports the safeguards included in UNFCCC guidance

related to REDD+, by paying particular attention to Decision 1/CP.16 and its Appendix I as adopted by the UNFCCC

Please list and briefly describe the Safeguards Plan(s) that have been developed and how said Plan(s) will be implemented in the course of the ER Programme.

Refer to **criteria 24, indicator 24.2** of the Methodological Framework

Seven strategy initiatives, as outlined in the National REDD+ Strategy, will be applied in the ER Programme landscape. They derive from the original thirteen strategy options identified in the R-PP. These strategy initiatives include:

- I. Improving the quality of multi-stakeholder dialogue and decision-making
- II. Clarifying rights regime
- III. Addressing unsustainable timber harvesting
- IV. Mitigating effects of agricultural expansion (particularly cocoa in the HFZ)
- V. Strengthening local decentralised management of natural resources
- VI. Expansion of high biomass agroforestry /tree crops systems
- VII. Improving regulation of mining activities to reduce forest degradation

An opportunity and risk matrix for the above strategy options was carried out and included in the SESA report for the REDD+ process (See Section 6 of the SESA report)⁸³. The opportunity and risk matrix also included enhancement measures for the opportunities identified, mitigation measures for the identified risks as well as responsible institutions to be involved with the implementation.

Building upon these strategy options, the GCFRP Implementation Plan (Section 4) has outlined a set of priority interventions and activities (Figure 4) that are arranged according to 5 key pillars that will be implemented to set the programme in motion and enable it to achieve its goals. The 5 main pillars include: A) Institutional Coordination and MRV; B) Landscape Planning within Hotspot Intervention Areas (HIAs); C) Increasing Yields via Climate-Smart Cocoa; D) Risk Management and Finance; and E) Legislative and Policy Reforms. These pillars are based on the original pillars described in Ghana's ER-PIN and derived from the seven strategy options or initiatives.

These interventions and activities are intended to reduce deforestation and forest degradation across the programme area. These activities and elements are specific in their focus, and their design and implementation plan meets relevant World Bank social and environmental safeguards, and also promotes and supports the Cancun safeguards. The World Bank safeguards policies, procedures and practices are consistent with the Cancun safeguards for REDD+. The approach for designing the strategy options and interventions was through a multi-stakeholder consultations and participation involving relevant public sector institutions, private organisations, civil society groups, traditional authorities, local communities, cocoa farmers, women and disabled/physically challenged persons. A stakeholder participation and engagement platform has been established for the REDD+ and ER Programme from the onset of the REDD+ readiness phase to provide transparent stakeholder information sharing and consultation mechanisms that ensure broad support and effective participation of relevant stakeholders, particularly local communities, cocoa farmers and traditional authorities.

The risk management and finance pillar embraces the development of a climate risk insurance facility to address impacts associated with low or failed cocoa yields under the programme so that cocoa farmers

⁸³ GoG, 2014. Strategic Environmental and Social Assessment (SESA) for REDD+ Mechanism, Forestry Commission -Ministry of Lands And Natural Resources. <http://www.fcghana.org/userfiles/files/REDD%2B/FINAL%20SESA%20report-18122014.pdf>

implementing the ER Programme interventions will have the assurance to continue in spite of the adverse impacts associated with severe weather events (i.e. this is consistent with paragraph 28a of Decision 1/CP. 16 of the Cancun Agreement).

The GCFRP identifies the need for legislative and policy reforms which are essential to the overall success of the programme and is advocating for the passage of the Wildlife Resources Management Bill which will support effective implementation of the new Forest and Wildlife Policy (2012). The programme is also collaborating with relevant stakeholders to effect necessary policy reforms in two major areas to support effective implementation of the programme. The policy reform areas identified are tree tenure and cocoa farm input reforms. In addition, there is the need to develop policies to address carbon transaction rights and benefit-sharing arrangements. The policies and policy reforms will especially help in promoting sustainable management of forests and forest related resources in the cocoa landscape. In this regard, the Timber Resources Management and Legality Licensing Bill is currently in parliament for consideration into an Act. This Bill if passed will among other things improve timber harvesting regulations in off-reserve areas as well as the issuance of FLEGT licences for legal timber trade.

Safeguards Plan(s) (Figure 17) and documents that have been developed and how these will be implemented



Figure 17: Schematic of Safeguards plan for REDD+

Key safeguards documents that have been developed under readiness and FIP to ensure that safeguards related issues are integrated into the ER Programme include:

- a. a Strategic Environmental and Social Assessment (SESA) Report for REDD+
- b. an Environmental and Social Management Framework (ESMF) for REDD+
- c. a Resettlement Policy Framework (RPF) for REDD+
- d. an ESMF for the Forest Investment Programme (FIP)
- e. a Process Framework (PF) for the FIP
- f. Pest Management Plan (PMP) for the FIP
- g. Communication Strategy

SESA Report

The SESA report identified the risks/opportunities using a participatory approach with corresponding mitigation measures and responsibilities for the strategic interventions proposed for Ghana's REDD+ process which includes the seven strategy actions to be applied in the ER Programme area. These have been captured under Section 6 of the SESA report. The report also reviewed relevant policies, laws and regulations (PLRs) and made suggestions for regulatory reforms where appropriate. Appropriate mitigation measures/recommendations are provided in the report to guide the implementation of all REDD+ interventions in the country including the proposed ER programme. The National REDD+

Secretariat (NRS) of the Forestry Commission is responsible for ensuring that mitigation measures and recommendations provided in the SESA report applicable to the ER Programme area are implemented.

ESMF for the REDD+ Mechanism

The ESMF establishes clear procedures and responsibilities for the environmental and social screening of all likely interventions under the ER Programme, and identifies the environmental/social issues/concerns and likely impacts from the proposed ER Programme intervention and recommends appropriate mitigation measures to address the likely adverse impacts or risks. The document has identified relevant institutions to be involved with the implementation of the environmental/social mitigation measures and provides an environment/social due diligence capacity and training programme to ensure that appropriate training is provided to the institutions with limited capacity in environmental/social safeguards. It specifies appropriate roles and responsibilities and outlines the necessary reporting procedures for managing and monitoring environmental and social concerns. The ESMF will be executed by the Forestry Commission (at both the national, regional and district levels) in collaboration with other partners such as MLNR, COCOBOD, MOFA, EPA, Water Resources Commission, Lands Commission, **District Assemblies, and other institutions to be identified**. Detailed roles and responsibilities of these institutions are captured in the ESMF document.

RPF for the REDD+ Mechanism

The RPF is prepared to contribute to the smooth implementation of the ER Programme with regards to social impacts arising from the implementation of the interventions such as land-take, livelihoods, physical or economic displacement, access/restricted access to natural resources/forest by local communities, impact on cultural heritage resources, and vulnerable persons among others. The RPF includes measures to ensure local participation for social cohesion and sustainability of the interventions. The RPF identifies national policies, laws and regulations that need to be complied with, and also gaps between these national policies, laws and regulations and the World Bank safeguard policy on involuntary resettlement (OP. 4.12). It is clearly stated in the RPF that “Where there are gaps or inconsistencies between Ghanaian laws and the World Bank policy on involuntary resettlement, OP 4.12, the RPF which is consistent with the World Bank policy OP 4.12 will apply”.

ESMF & PF for the FIP

In 2012, Ghana was selected as a pilot country under the Climate Investment Fund (CIF), with the submission of its Forest Investment Plan (FIP). The FIP addresses the institutional and policy context as well as piloting and testing on the ground. The three main projects include: 1) Reducing pressure on natural forests through an integrated landscape approach (IBRD); 2) Engaging local communities in REDD+/ enhancing carbon stocks (African Development Bank); 3) Engaging the private sector in REDD+ (IFC).

There is significant overlap and synergy between the FIP and the ER Programme in terms of articulated activities and the target landscapes. The FIP focal area targets the Western Region, located in the ER Programme area (cocoa forest mosaic landscape), and the Brong-Ahafo Region, which encompasses part of the cocoa forest mosaic landscape. The proponents of the FIP and the ERP see this activity-based and geographic overlap as being strategic and essential for the successful implementation of the ER Programme. The MLNR has a representation on the ER Programme’s Coordination and Management Committee to ensure integration with FIP projects and related activities.

An ESMF and Process Framework (PF) has been specifically prepared for Ghana's Forest Investment Programme (FIP) that outlines procedures to be followed to address environmental and social issues/impacts/concerns likely to emanate from the implementation of the proposed interventions under the FIP as well as local community access to natural resources in the FIP project sites. An institutional training needs to ensure the smooth implementation and monitoring of the environmental/social issues/impacts identified in the ESMF/PF is currently being implemented. The Ministry of Lands and Natural Resources (MLNR) is directly responsible for the Implementation of the FIP ESMF/PF.

PMP for the FIP

The FIP finances three inter-related projects within the ER Programme area in Ghana. The FIP set of activities collectively aim to:

- ensure the integrity, restoration and sustainable forest management of forest reserves by introducing more inclusive management and benefit sharing models, financial incentives, and investments;
- restore forest cover in off-reserve areas by securing tree tenure and benefits, forest plantations and landscape restoration, and rehabilitation of degraded forest land; increase tree cover and enhance carbon stocks in the farming system by promoting sustainable cocoa and agriculture practices; and
- develop viable alternative livelihoods for local communities by addressing a broad range of technical, financial and market incentives, to reduce pressure on existing forests.

The FIP project has triggered the World Bank safeguard policy on Pest Management (OP 4.09) (together with the Environmental and Social Assessment- OP 4.01 and the Process Framework- OP 4.12) resulting in the preparation of the Pest Management Plan.

The specific objectives of the PMP prepared for the FIP are to:

- Ensure integration of appropriate pest management techniques into agro-forestry technologies, and cocoa landscapes in the project area.
- Monitor pesticide use and pest issues among participating farmers, admitted farmers within forest reserves, and local communities.
- Promote implementation of an Integrated Crop and Pest Management (IPM) in Cocoa production.

To achieve the objectives of the PMP, the PMP provides relevant information on; (i) promoting the IPM approach for the cocoa sector including the promotion and adaptation of climate smart cocoa, (ii) summarizing the national pesticide use and management in Ghanaian agriculture and in the cocoa sector in particular and (iii) providing insight and recommendations on the capacity building opportunities for the promotion of IPM and rational use of pesticides in Cocoa production, (iv) implementation strategies and budget for the PMP.

How the Safeguard Documents/Plans will be implemented

Ghana will implement REDD+ using a jurisdictional approach at the sub-national level, i.e. beginning with the ER Programme area. Generally, management and monitoring of emissions reductions, safeguards and indicators, will be in line with the national systems and institutions put in place for the implementation of the REDD+ programme. The high level oversight and management of the ER programme will sit with the Joint Coordinating Committee.

The Joint Coordinating Committee is a six person committee that was established in 2015 to support the development of Ghana's Cocoa Forest Programme (GCFRP), to ensure efficient communication and coordination between the NRS, Cocoa Board, the FIP, and the National REDD+ Working Group, and to

eventually serve as a body to coordinate high level implementation. The JCC is made up of two representatives from the NRS, two representative from the Forest Investment Programme (one from FC and one from the MLNR), and two representatives from the Ghana Cocoa Board.

The National REDD+ Secretariat (NRS) and the sub-working group on safeguards, who work in close collaboration with the Environmental Protection Agency (EPA), are responsible to ensure that safeguards are taken into consideration in the development and implementation of interventions under the GCFRP. The organogram of the NRS as provided below (Figure 18) has among others (1) a manager responsible for safeguards and (2) an officer responsible for FGRM. These two report directly to the Head of the NRS, and are to ensure that safeguard and FGRM issues under ER programme interventions are identified and the Safeguard documents are brought up for implementation and monitoring. They will be responsible for generating status reports/outputs as appropriate.

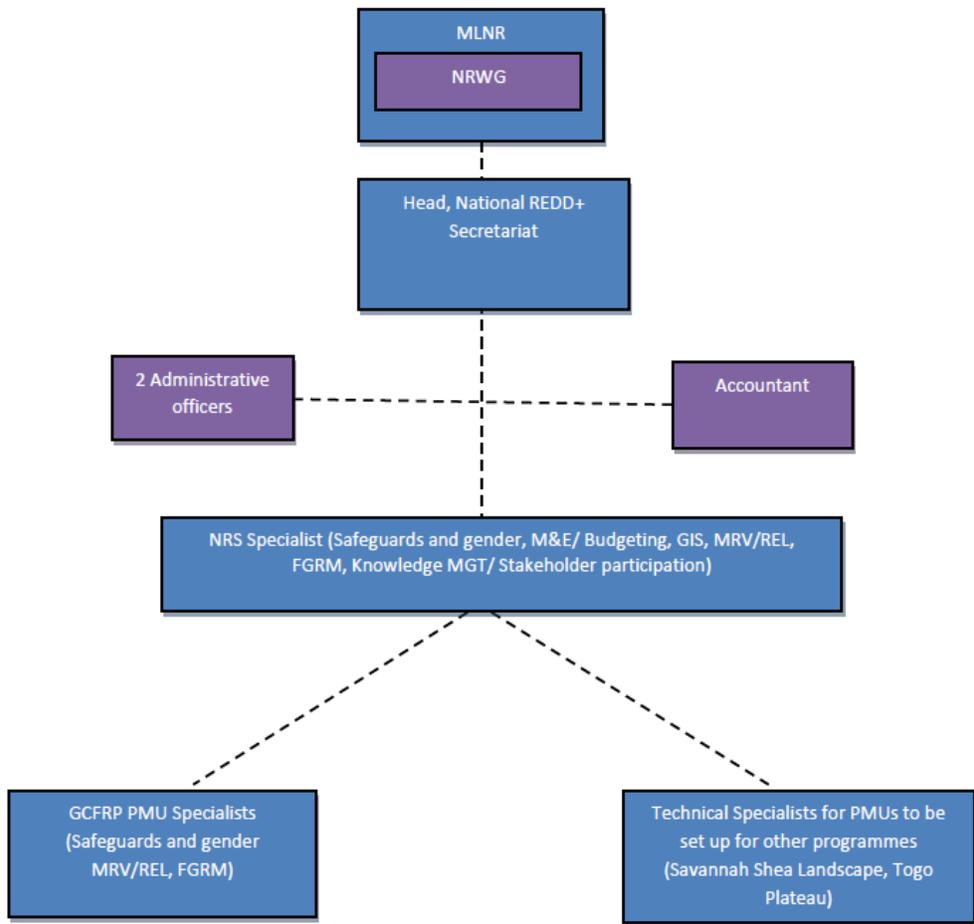


Figure 18: Organogram for the NRS

Under the FIP, **an officer has been assigned** to handle safeguards issues and the REDD+ Safeguards **teams** situated within the PMU would be expected to work closely with the **REDD+/FIP Safeguards specialist** for full implementation of the ER programme interventions and activities. In addition, the FIP safeguards **specialist** serves on the National REDD+ Safeguards sub-working group to promote effective coordination and implementation at the national level.

14.2 Description of arrangements to provide information on safeguards during ER Program implementation

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Please describe the arrangements for providing information on how the ER Programme meets the World Bank social and environmental safeguards and addresses and respects the safeguards included in UNFCCC guidance related to REDD+ during ER Programme implementation. Where relevant, provide reference to the descriptions in the Safeguards Plan(s).

Refer to **critterion 25** of the Methodological Framework

There are included in the various safeguard documents prepared for the REDD+/ ER Programme, monitoring and evaluation sections, which identifies environmental and social monitoring issues, verifiable indicators and responsible institutions (e.g. See Section 9 of the ESMF for the REDD+ Mechanism, Section 9 of the RPF for the REDD+ Mechanism, Section 9 of the FIP ESMF, Section 5 of the FIP PMP). The safeguard officers with the NRS will ensure that the monitoring programmes provided in the safeguard documents are implemented and where necessary, a local environmental/social consulting firm will be engaged to assist with the provision of information on safeguards during implementation. The FIP has already initiated the procurement process to select an environmental/social consulting firm to assist the Ministry of Lands and Natural Resources (MLNR) with the provision of information on safeguards during implementation of FIP interventions to ensure that safeguard issues are not ignored or sidelined.

The NRS has also engaged a local environmental/social consultant to develop a **Safeguards Information System** (SIS) for the REDD+/ER Programme that will provide information on how safeguards are being addressed and respected throughout the implementation of the activities. **The SIS will report on co-benefits of REDD+ implementation and would contain information on risks and opportunities of REDD+ actions from project level to national with verifiable process, policy and outcome indicators for monitoring.** The SIS which would be a web-based system will enable local, **national and international** stakeholders to effectively monitor **Ghana's** compliance with **REDD+** safeguards.

The Programme Management Unit (PMU) will be the executing body for the GCFRP **and establish a competent safeguards teams** to handle safeguards related issues. Training programmes will be organized to build the capacity of the PMU staff, HIA consortium partners and governance body on REDD+ safeguards.

14.3 Description of the Feedback and Grievance Redress Mechanism (FGRM) in place and possible actions to improve it

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Please summarize the assessment of existing FGRM(s), including any applicable customary FGRMs, in place and describe the FGRM procedures for the ER Programme. Where applicable refer to descriptions available in other documents such as Benefit Sharing Plan and/or relevant Safeguards Plans. If applicable, provide a description of planned actions to improve the FGRM(s)

Refer to **critterion 26** of the Methodological Framework

There are existing channels for addressing forest-related conflicts and grievances from complainants. These options include litigation in court or informal arbitration and mediation. One avenue being developed, and depending on agreement by the landowner/complainant, is through local leaders on a District Dispute Resolution Team, made up of district assembly, religious leaders, traditional leaders (including Queen Mothers), District Forest Managers, and/or other opinion leaders.

Traditional Chiefs, Elders and “Queen Mothers” operating as recognized bodies for dispute resolution have always been the “first port of call” in settling local level disputes and act as agents of change, and as such, their role in conflict resolution is that of mediation and arbitration.

As stipulated in the R-PP, “the principle of subsidiarity will be used in establishing conflict resolution structures, with conflicts being addressed at the lowest or most localized level as appropriate. Relevant structures include traditional authorities and land and general courts. Should a large number of conflicts specific to REDD+ occur or it prove difficult for issues to be resolved at lower or localized levels, conflicts can be escalated to higher levels”.

Other higher level avenues are to take it to a Regional Dispute Resolution Team, or a National Dispute Resolution Team with a similar composition as the District Dispute Resolution Team, **composed of the District Chief Executive, as well as District Forest Manager, Traditional Authority, and other opinion leaders**. Complaints, petitions and concerns can also be addressed to the Chairman of the Timber Rights Evaluation Committee at the Forestry Commission Headquarters for resolution in accordance with existing legal framework under the:

- Timber Resources Management Act of 1997 (Act 547) which introduces Timber Utilization Contracts (TUCs) for timber harvesting and enhanced benefits for landowners and farmers for harvesting of trees on their land, as well as providing for payment of royalties in respect of timber operations; and
- Timber Resources Management Regulations of 1998, which establishes regulations for the management of timber pursuant to the Timber Resources Management Act of 1997.

However, from previous studies and surveys on capacity building needs in relation to REDD+ it is clear that despite extensive consultations at **national, regional, district and local levels**, there remains a gap in knowledge about REDD+ and climate change issues among stakeholders at different levels. There is the growing need for filling the capacity gaps of some institutions, particularly the government agencies, district assemblies, the traditional authorities, local communities within the affected regions of the ER program area to catalyze the implementation of the FGRM process.

The current governance-related arrangements in place have gaps that must be addressed. Recommendations have been made in the proposed Feedback and Grievance Redress Mechanism (FGRM) to improve sector governance through sustained multi-stakeholder participation in developing policy options and designing the institutional framework for addressing these in a manner that works for all stakeholders in REDD+ eligible areas including the ER programme area. The proposed FGRM ensures

coordination between local, regional, sub-national and national entities engaging in REDD+ implementation activities by pursuing a process of full and effective participation of wider stakeholder groups as the means to address and resolve grievances in an inclusive and transparent manner.

At the same time, operational guidelines for addressing forest /REDD+ grievances have been developed in consultation with key stakeholders, awaiting broader national stakeholder validation. There is also a plan to train and build the capacity of stakeholders, especially at the District level, on the FGRM procedures and support the REDD+ secretariat to administratively support the institutional capacity building efforts.

The major forest conflict issues such as land and tree tenure, boundary and benefit-sharing are enmeshed in complex statutory and customary legal orders for settlement of disputes and enforcement. Resolving them through the courts tends to be a lengthy and costly process. For this reason, the promotion of the ADR Act to help resolve delays in dispute resolution have a better potential since sustainable forest management requires collaboration, making the disputants interdependent on each other for a successful forest management programme. Fortunately, Ghana has an ADR Act (Act 798 of 2010) in place supporting mediation, arbitration and customary arbitration procedures. However, there is a provision that exempts environmental issues from being addressed through ADR. **Subsequently, a letter has been sent to the Attorney General's office to enquire reasons for the exclusion of environmental issues from the current ADR Act 2010. Based on the outcome, it is envisaged that, amendment of the Act may be considered to include environmental issues to allow grievances related to REDD+ to be resolved by ADR.**

Ghana REDD+ Feedback and Grievance Redress Mechanism (FGRM): Operational Guidelines

The proposed FGRM procedures and modalities for implementation within the ER programme is given in **Figure 19.**

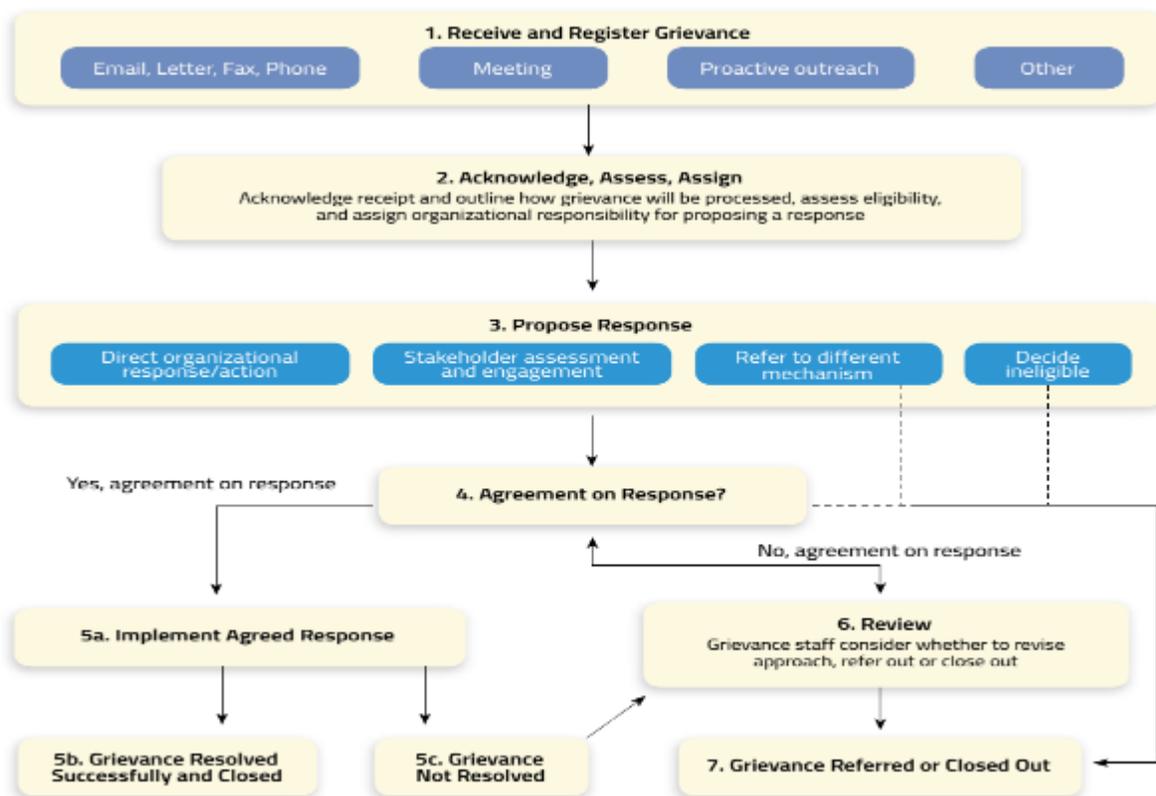


Figure 19: Generic model of GRM⁸⁴

There are different modes for receiving complaints from aggrieved persons at the local level. Complainants can either choose to register their grievance with a Traditional Authority, or forest or wildlife officer within their local setting.

The 2012 Forest and Wildlife policy, states among other things in 4.1.1.b, to “Enact the legislations that will enable communities and individuals to benefit from trees on their farms and fallow lands, provide off-reserve tree tenure security, authority to legally dispose of resources and allocate greater proportion of benefits accruing from resource management to community members individually or collectively”. The NRS has commenced engagement with the Parliamentary Select Committee on Lands and Forestry with the goal is to advance the required legislation. There is a high level of support and enthusiasm from the Parliamentarians to realise this goal.

Under the NREG-TA, an assessment and set of recommendation on possible reforms has been completed on tree tenure. There is ministerial approval for these to be piloted within the HIA and based on results and lessons learned, legislation will be enacted.

⁸⁴ Consensus Building Institute, 2013, p12). This model has also been recommended by the Joint FCPF/UN-REDD Programme

15. BENEFIT-SHARING ARRANGEMENTS

15.1 Description of benefit-sharing arrangements

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Please provide a description of the benefit-sharing arrangements for Monetary and Non-Monetary Benefits of the ER Programme to the extent known, including:

- i. the categories of potential Beneficiaries, eligibility and the types and scale of potential Monetary and Non-Monetary Benefits;*
- ii. Criteria, process and timelines for the distribution of Monetary and Non-Monetary Benefits;*
- iii. Monitoring provisions.*

Where available, provide a link to the publicly available Benefit Sharing Plan or inform when the Benefit Sharing Plan is expected to be concluded and available.

*Refer to **critterion 29 and 30** of the Methodological Framework*

The ER Programme is expected to generate monetary and non-monetary benefits. The Government of Ghana has conducted a thorough assessment of existing benefit sharing options within the forestry sector and their possible applicability to REDD+ benefit sharing, through extensive consultations during readiness. Necessary arrangements are in place to define the GCFRP Benefit Sharing arrangements by first quarter of 2017 with the aim to clearly articulate the source and type of monetary and non-monetary benefits, eligible stakeholders with rights and responsibilities, the terms of contribution, and the allocation of benefits.

The basic principles of developing the BSP for the GCFRP have been discussed through the early design process during expert meetings, public consultations and various analytical studies. It has also benefitted from initial work by consultants and partner NGOs, as described in Section 15.2. As a result, stakeholders in Ghana have a solid understanding of the related issues and have a broad framework for completing the design of the BSP for GCFRP.

GCFRP benefits to communities are expected to incentivize them towards the adoption of more sustainable land uses, for community-level (HIA landscapes) and individual farmer benefits. Most benefits provided by the GCFRP will be in the form of 'non carbon benefits,' such as increased income from new land use practices, natural resource-based small enterprise development, improved and less variable crop yields, reduced risk and more secure ecosystem services such as provision of rainfall, pollinators, and soil fertility. The distribution of 'non-carbon benefits' is part of the design of GCFRP.

The BSP is being developed in a step-wise fashion. At a national level, Ghana has received input on benefit sharing options and mechanisms from the readiness process⁸⁵ and stakeholder projects. The BSP design will be finalized and validated during the coming months, through multi-stakeholder consultations to be led by the NRS and NCRC. However, agreement and implementation at the local level will start with implementation in the initial HIAs and it is anticipated that it will become more complex as the GCFRP evolves, capacity is strengthened, and experience is gained; The BSP Manual will need to be approved by the FCPF-WB before the ERPA is signed.

Principles

The Benefit Sharing Plan will be guided by the following principles:

⁸⁵ FORIG, 2014. Benefit Sharing Mechanism for REDD+ Implementation in Ghana.

- Voluntary participation: While no obligation or restriction of use is imposed on any private stakeholders, participation will be encouraged through benefit incentives as well as continued stakeholder engagement;
- Inclusive and equal access: Land owners, land users, local communities, and all stakeholders who are directly affected by the ER Programme are eligible for participation;
- Transparency: The BSP is built and designed from within / by stakeholders and communities; it's results, in terms of substance and process, are shared in detail with the public;
- Equity and fairness: Benefits are shared evenly among stakeholders, differentiating solely on the basis of different levels of contributions;
- Return for efforts: REDD+ benefits are not rent-based revenues, but the return for efforts made by stakeholders.

The BSP will build on existing government structures that already have experience on reaching out to and mobilizing communities at the local level with particular reference to the Cocoa Board and the cocoa private sector, which have existing systems for distributing in-kind benefits and post-harvest “bonuses” back to individual farmers. Communities will be consulted during the BSP preparation, and the implementation of the BSP will be assessed in the initial implementation years to ensure communities’ concerns are properly considered. The Government’s GCFRP Grievance and Redress Mechanism will be a tool for communities to address their grievances.

To facilitate agreement amongst stakeholders: individual farmers, communities, and land owners, and other vulnerable groups and individuals (including women, unemployed youth, under-served communities and pastoralists) will be organized into HIA organizations (e.g. a CREMA-like structure) that will enable them to use their own by-laws to establish landscape management rules and benefit sharing agreements. This is viewed as an important and effective way to ensure inclusiveness and to help empower communities to negotiate appropriate and fair benefits within the context of the BSP.

Benefit Types

The GCFRP will trigger direct and indirect benefits, and it is expected that these benefits from GCFRP implementation will extend to local communities within the programme area, the country as a whole, the region, and the globe. Direct benefits concerns the (ongoing) technical, financial, institutional and regulatory “in-kind” assistance provided, as well as the carbon benefits proper; the proceeds from emission reductions sales (“carbon or emission reductions (ER) benefits”) that will be generated. The ER payments would only occur when the GoG demonstrates, and a third party verifies that emissions from forest cover change have been reduced over the programme area in aggregate. The BSP establishes, among others, the eligible beneficiaries, the level of benefits, rules of the use of these benefits, funds flow, and auditing and monitoring procedures to be carried out by the Government.

Indirect benefits, which over time will be vastly more important than the direct benefits, concern the long-term gains from improved social infrastructure (better governance, smarter education, more inclusive engagement, reduction of illegal activities, etc.) and enhanced land-use practices (increased cocoa profitability based on higher-quality yields, better resource management, improved livelihoods, etc.). These benefits also include regulating services such as local climate (i.e., trees on-farm provide shade, soil moisture, and nutrient cycling, while forests influence rainfall and water availability both locally and regionally), provisioning services such as food, fodder, fuelwood and freshwater (and income

from some of these), supporting services such as maintenance of genetic diversity and habitats (critical for medicine in the local context), and cultural services like sacred forests (although fragmented in the landscape) and nature-based tourism (which holds great promise for green growth in such as diverse landscape). The carbon finance and REDD+ literature refers to many of these benefits as co-benefits, and often specifically includes improvement of livelihoods options, improved access to forest resources; and NTFPs (honey, medicinals, spices, etc.).

Distribution of Emission Reductions Payments

Net emission reductions payments refers to the overall ER payments, minus programme implementation and management costs. The programme management costs will be capped at a certain yearly amount, to be agreed during the BSP manual preparation. It is anticipated that the proceeds received from ER payments will cover – in this order – ERPA transaction expenses; ER Programme institutional costs (including inherent programme costs such as for monitoring and MRV); operational costs for Programme-related enhanced education and social services; other expenses; and a funding reserve (for unforeseen funding needs and scale-up investment).

The GoG is in the process of revising forestry benefit sharing agreements. The recommended changes will be tested in the initial HIAs, including those under the FIP, with approval from the MLNR and the FC, and will then drafted into law.

The distribution will be organized and implemented by the GCFRP PMU, as supervised by the GCFRP JCC and Steering Committee and the NRWG. Private stakeholders have the right to appeal any implementing measure on the ground that is not in line with the BSP to the dispute resolution bodies (see section 14).

On the sensitive subject of benefit sharing, it is crucial that communications with stakeholders are handled in a manner that helps to manage expectations. This requires measured and consistent messaging, and caution not to place too much emphasis on "cash transfers". Experiences from some national programmes have shown unwarranted elite capture, free-ridership leading to the alienation of rightful beneficiaries/stakeholders. This situation arises when such an incentive scheme becomes a tool for patronage in the hands of influential persons who would want to reap undeserved benefit. To ensure that such pitfalls are avoided, these experiences and lessons will be brought to bear in the development of the BSP which is expected to be developed well-before the end of 2016. It will be more sustainable and transformative to invest financial resources accruing from emission reduction performance into social development programmes that meet the priorities of intended beneficiaries. This would engender broad-based buy-in and community ownership.

Stakeholders and Eligible Beneficiaries

Benefits should reach primarily those that contribute to the results under the programme. Eligible requirements of beneficiaries will be identified during the preparation of the BSP and consulted using a robust, inclusive process. During the GCFRP preparation, the following eligible entities have been identified--Forest-dependent communities organized into HIAs, including Traditional Authorities, community groups or individual farmers/forest users.

It was agreed that other eligible beneficiaries could be included in the BSP in the future, such as communities outside of HIAs.

There was agreement that the GCFRP will strive to ensure that the eligible HIA stakeholders are inclusive, particularly with respect to vulnerable and underserved communities, migrants, and women.

There was also agreement that the PMU would sign a Benefit Sharing Agreement with eligible beneficiary institutions, in which roles and responsibilities of each party is clearly spelled out. Before signing this Agreement, the PMU is expected to do an assessment of the organization, and ensure that it meets minimal conditions to receive the benefits. One of these conditions is their degree of inclusiveness of vulnerable groups. GCFRP will detail within the BSP: (i) the key elements of a standard GCFRP Benefit Sharing Agreement; and (ii) the process and scope of conducting the proposed assessment.

Rules for Benefit Distribution

Benefits will be distributed following the successful implementation and monitoring of the GCFRP. Further work is planned to outline the operationalize approach. These rules will eventually be reflected in the BSP Manual.

Large discrete geographic areas in GCFRP

At the beginning of implementing the GCFRP (pre-ERPA), there will be 2-3 HIAs that will be the focus of early efforts to reduce deforestation and forest degradation. Benefits across these initial HIA areas, and in subsequent HIAs, will be distributed according to a formula (to be developed) that takes into account the relative performance of these areas in contributing to reduced deforestation. During the design process of the BSP, the rules on how to measure performance within discrete geographic areas will be determined.

Within the specific HIAs defined above, benefits would be shared among eligible beneficiaries (HIA stakeholders, government) according to a formula to be agreed. Once again, performance is to be a consideration in this formula. Some of the potential indicators of performance to be considered at the HIA level could be: hectares of land forested, hectares of forest under CSC management, percentage of reduced deforestation. Benefit distribution to Government agencies would also follow the performance principle, that is, those agencies that directly contribute to the production of ERs would receive benefits as ER payments. This will be detailed in the BSP Manual.

Use of the Benefits at the Local Level

Most of the ground-level benefits that will flow to local communities (HIAs) should be decided by the communities and HIAs themselves. In general, it is expected that the benefits would be used for the communities' local development priorities, and would create incentives for community members to continue contributing to reducing deforestation and degradation or increased carbon stocks, such as by not clearing new land for agriculture, contributing to firefighting, sustainably managing forest resources, etc. This approach should allow the GCFRP benefits to complement and leverage other sources of funding, and create incentives for continued support to REDD+ in the programme landscape. GCFRP and partners would use locally arranged consultative processes to engage communities in determining how to use their allocation of the GCFRP carbon benefits, taking into account the agreed principles. The BSP Manual would contain a negative list of activities / items (i.e. could include encroachment in forest reserves, lack of compliance with HIAs management plans) that cannot be financed by the ER payments. The BSP Manual will also cover how stakeholders will receive and costs covered for Technical Assistance (TA) to implement land use activities such as climate-smart agriculture, CREMA, carbon stock enhancement.

Funds Flow and Management

A robust funds management entity and flow-of-funds mechanism will be identified to allow the GCFRP benefits (ER payments) to be distributed from the government to the several eligible beneficiary groups. The funds management entity and the flows-of-funds mechanism will be identified and agreed upon during the BSP design process, as well as the monitoring and auditing procedures.

Monitoring of the BSP

GCFRP PMU will have primary responsibility for monitoring how and whether the benefits are being transferred adequately, and how they are being used.

15.2 Summary of the process of designing the benefit-sharing arrangements

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Please provide a summary of the overall process of designing the benefit-sharing arrangements, including who has been participating in this process and how the process was informed by and builds upon the national Readiness process, including the SESA. Please describe how the benefit sharing arrangements have been prepared as part of the consultative, transparent and participatory consultation process for the ER Programme. Please attach evidence of the process and how it reflects inputs by relevant stakeholders, including broad community support by affected Indigenous Peoples as an annex to this document.

*Refer to **critterion 31** of the Methodological Framework*

The process of establishing rules for REDD+ benefit sharing was initiated in 2013 by the NRS through a consultancy on benefit sharing options, conducted by FORIG. Partner NGOs, like IUCN-Ghana have also provided input to the benefit sharing dialogue following the implementation of a project focused on benefit sharing arrangements within the GCFRP landscape. Finally, the MLNR, under the NREG-TA, initiated a review of benefit sharing options in 2015, which is now under validation. As a result, benefit sharing options and ideas have been subjected to multiple discussions involving a wide range of public sector, civil society, traditional authority, and other stakeholders. The final BSP will be established on the basis of the final ERPD and in close consultation with all stakeholder groups referred to above. The final draft plan will be submitted for formal approval by:

- Stakeholders within the HIAs, including community members and Traditional Authorities;
- Members of the HIA consortiums, including the District Assemblies and private sector partners from the Accounting Area;
- Regional House of Chiefs from the Accounting Area;
- Forestry Commission;
- Cocoa Board; and
- Other relevant stakeholders.

15.3 Description of the legal context of the benefit-sharing arrangements

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Please describe how the design and implementation of the Benefit-Sharing Plan complies with relevant applicable laws, including relevant international conventions and agreements and customary rights if any.

*Refer to **critterion 33** of the Methodological Framework*

The development and implementation of the BSP will respect all legal rights of land tenure holders in the accounting area and will be subject to legal review under both REDD+ specific dispute settlement rules and domestic law. The scope and inter-play of customary and statutory laws is clearly defined in the Constitution, and there are already more than two decades of experience implementing benefit sharing systems in Ghana (e.g. CREMAs) in which the customary and statutory laws converge effectively and equitably on the ground for stakeholders. Despite existing uncertainties in pending legal reforms, the BSP will be supported by the directives laid out in the 2012 Forest and Wildlife Policy and grounded in the framework that authorizes benefit sharing of natural resources within CREMAs. Benefit distribution will also strictly comply with the international REDD+ framework as established by the Warsaw Framework for REDD+ and the Paris Agreement.

16. NON CARBON BENEFITS

16.1 Outline the potential Non-Carbon Benefits and identification of Priority Non-Carbon Benefits

Please outline the potential Non-Carbon Benefits for the ER Programme. Identify priority Non-Carbon Benefits, and describes how the ER Programme will generate and/or enhance such priority Non-Carbon Benefits. The priority Non-Carbon Benefits should be culturally appropriate, and gender and inter-generationally inclusive, as relevant

*Refer to **critterion 34** of the Methodological Framework*

Non-Carbon Benefits (NCB) from REDD+ also known as “co-benefits” or “multiple benefits”, is a term referring to the factors and contributions of REDD+ that go beyond mere carbon storage and carbon sequestration in forests. The aim and desired outcomes of the GCFRP is to go beyond the minimum requirements of safeguards, which ensure that the programme does no harm to livelihoods and biodiversity, by making sure that it has a significant positive impact through the enhancement of livelihoods, social norms and rights, the generation of environmental gains, the conservation of natural forests and their ecosystem services, and the promotion of effective forest governance mechanisms.

The identification of NCBs under the GCFRP are guided by REDD+ safeguards, which take into consideration the broad definition and categories of NCBs, including social, environmental and governance benefits in accordance with national/subnational objectives and circumstances, while also being consistent with relevant international agreements, conventions and instruments, including the Cancun Agreement and the three Rio Conventions.

In order for the national REDD+ Strategy to effectively promote NCBs, specific NCBs were identified and prioritized according to national objectives and circumstances through consultations and assessments conducted across all levels, including processes which led to the identification and design of safeguards.

The three main classes of NCBs identified under the programme are described in the Table 18 and ranked according to their importance. The strength of this programme is that these benefits are built into the programme’s design and integral to its overall success.

Table 45: Description of Non-Carbon Benefits

Priority Non-Carbon Benefits
Socio-economic Benefits
<ol style="list-style-type: none"> 1. Increased yields via CSC: Farmer engagement package that gives farmers access to planting materials, access to inputs, access to technical extension, access to business extension, and access to financial and risk products will enable 50%-200% increases in yields. Income from cocoa farming will be further increased by ensuring transparency in cocoa purchases. 2. Improved livelihood opportunities, as a result of the various program activities and interventions, for women and migrant farmers, leading to strengthened socio-economic opportunities and outcomes, will result due to the priority attention under HIA Landscape Consortiums. 3. Development of HIA landscape management plans that will eliminate illegal and unsustainable land use conversion and extraction, and create new opportunities. 4. Development of HIA financially sustainability plans and agreements leading to enhanced development at community scales and economic opportunities.
Governance Benefits
<ol style="list-style-type: none"> 1. Tree tenure reformed and resource use rights improved for farmers, land users, etc. 2. Improved law enforcement via increased capacity and resources to FC staff, and strengthened collaboration with HIA communities on monitoring and enforcement of local by-laws and national laws. 3. Development of HIA Governance Boards that enable community-based landscape governance. 5. Improved institutional collaboration and coordination amongst government agencies and with the private sector, leading to more efficient and effective engagement in the landscape.
Environmental & Sustainable Production Benefits
<ol style="list-style-type: none"> 1. Development and implementation of a Ghana Climate Smart Cocoa Sustainability Standard for cocoa leading to premium pricing and a new class of cocoa bean. 2. Cocoa farmers experience increased resilience to climate change as a result of climate smart cocoa practices, conservation of forests, and increased trees cover in the farming landscape that furnish key ecosystem services. 3. Conservation of biodiversity; 4. Security of supply against threats to national production from climate change and threats to the global cocoa / chocolate supply chains (\$120 billion/yr industry); 5. Improved water quality and quantity in the landscape.

16.2 Approach for providing information on Priority Non-Carbon Benefits

Please indicate how information on the generation and/or enhancement of priority Non-Carbon Benefits will be provided during ER Programme implementation, as feasible, by providing a description of the preferred methods

*for collecting and providing information on priority Non-Carbon Benefits taking note of existing and emerging guidance on monitoring of non-carbon benefits by the UNFCCC, CBD, and other relevant platforms. Refer to **critterion 35, indicator 35.1** of the Methodological Framework*

Identifying, incentivizing, monitoring and reporting on NCBs under the programme can be partially covered by Safeguard Information Systems (SIS) and additional key information will be incorporated into the Data Management System. During the completion of the BSP and the Data Management System, key non-carbon benefits will be selected and indicators determined for monitoring for inclusion in multiple reports and outputs, and to maintain compliance with UNFCCC.

The selected indicators, where appropriate and possible, will benefit from the full and effective participation of HIA members (local people and forest-dependent communities) and HIA Consortium stakeholders (DAs). The use of community-based monitoring of co-benefits (e.g. forests, biodiversity, land use and land use changes, effective participation) will be prioritized.

17. TITLE TO EMISSION REDUCTIONS

17.1 Authorization of the ER Program

Using the table below, please identify the national authority assigned with the responsibility to approve ER Programmes in accordance with national laws and regulations, as well as national REDD+ management arrangements. Where applicable, provide a reference to the decree, law or other type of decision that identified this national authority.

Please include as an annex to this document, the formal letter of approval for the ER Programme issued by this national authority. The written approval shall confirm that:

- a) The REDD Country Participant endorses the proposed ER Programme and its consideration for inclusion in the FCPF Carbon Fund; and*
- b) The ER Programme Entity that is proposing the ER Programme, whether it be the national government or another entity authorized by the national government, is authorized to enter into an ERPA with the Carbon Fund. This authorization can be provided through the letter of approval or by providing reference to an existing legal and regulatory framework stipulating such authority.*

*Refer to **critterion 36, indicator 36.1** of the Methodological Framework*

Table 46: National Authority Responsible for ER Program Approval

Name of Entity	Ministry of Lands and Natural Resources
Main Contact Person	Musah Abu Juam,
Title	Technical Director, Forestry
Address	P.O. Box MB40 Accra- Ghana
Telephone	+233-244362510
Email	abujuam@gmail.com
Reference to the decree, law or other type of decision that identified this entity as the national authority on REDD+ that can approve ER	MLNR established under section 11 of the Civil Service Law 1993 (PNDCL 327), is the sector Ministry for the FC, which was established under Act 571 (1999), and the FC is responsible for REDD+ coordination in Ghana, through the NRS. As such, the MLNR has the overall national authority to approve ER Programmes in Ghana.

A formal letter of approval by the MLNR is attached in **Annex 4**.

17.2 Transfer of Title to ERs

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Please demonstrate the ER Programme entity's ability to transfer Title to ERs to the Carbon Fund and provide a tentative risk rating that this ability is clear or uncontested. As part of this demonstration, include a discussion on the implications of the land and resource regime on the ability to transfer Title to ERs to the Carbon Fund. If significant difficulties in the ability to transfer ER titles have been identified, please indicated what proportion of the Accounting Area might be affected and what measures will be taken to establish this ability.

*The ability to transfer Title to ERs may be demonstrated through various means, including reference to existing legal and regulatory frameworks, sub-arrangements with potential land and resource tenure rights-holders (including those holding legal and customary rights, as identified by the assessments conducted under section **Error! Reference source not found.**), and benefit-sharing arrangements under the Benefit-Sharing Plan*

*Refer to **critterion 28, indicator 28.3 and critterion 36, indicator 36.2 and indicator 36.3** of the Methodological Framework*

Title to Emission Reductions is defined as “the full legal and beneficial title to [emission reductions] contracted for under the ERPA”, but it does “not entail any rights, titles or interests to land and territories”.⁸⁶ The genuine right to emission reductions is best understood as someone’s capacity to generate and market carbon credits (or carbon units) from a certain number of metric tonnes of avoided carbon dioxide emissions, removals or sequestration within the ER Program Accounting Area⁸⁷, and includes a legal commitment to exclusivity, i.e. the commitment not to generate and/or market any credits which would concern the identical emission reductions.

The existing legal framework in Ghana will not create a barrier to the transfer of title to ERs. This is because Ghanaian law recognizes such a right, as shaped by the country’s law of obligations, and allows for its transfer. By entering into the ERPA, the Government of Ghana, represented by the MoF, assumes the binding commitment to treat the emission reductions achieved in the ER Programme Accounting Area as unique and to transfer and market them, including any credits issued for them, exclusively to the FCPF Carbon Fund. The FCPF Carbon Fund, in turn, will receive full ownership over the emission reductions, including any credits attached, at the moment as defined in the ERPA. It may retire them or transfer them further (to the donor participants of the Carbon Fund or otherwise), or keep them ‘active’ in its accounts, as it sees fit.

The MoF is by function the authorized institution to sign such a contract on behalf of government. The combined effect of Article 176(1b) and Article 181(7b) of the 1992 Constitution makes the Minister of Finance or its representative the rightful institution to sign on behalf of government. This is further supported by the MoF’s function to serve as the government’s advisor on monetary and financial issues. the Government’s commitment towards the FCPF Carbon Fund does not impinge on any individual or collective rights nor does it impose an obligation for individuals or a collective, whether land tenure

⁸⁶ FCPF Carbon Fund Methodological Framework, definition § 30.

⁸⁷ FCPF ERPA General Conditions, definition of “Emission Reduction” (italics added).

holders or other. Participation of stakeholders is strictly voluntary, and those who do not wish to engage with the programme, will not face any limitation of their rights and practices within the ER Program Accounting Area whatsoever.

By contrast, those individuals, collectives or institutions that do choose to participate (i.e. become an HIA Consortium Partner or member of the HIA Governance Body) will replicate the title commitment which the Government assumes under the ERPA. This means that they would commit to treat the emission reductions achieved in the GCFRP area with their participation as unique and not to transfer and market them outside the commitment made by the Government towards the FCPF Carbon Fund.

The legal type, quality and classification of the relevant stakeholder commitment may vary according to the person, collective or institution in question. Each of these actors will be requested to produce a commitment instrument (“Instrument”) that confirms the key elements and targets of the ER Program as well as the actor’s terms of engagement (role, activity, consideration), coupled with an ER Commitment. The Instrument may, but Ghanaian law does not require it to be legally enforceable. The binding nature of the commitment made by the Government to the Carbon Fund, in any case, will not be compromised. As described in Section 4.3, agreements will be signed with HIA consortium members, Governance Board members and the PMU defining roles, responsibilities, and articulating investments as needed).

For example, District Assemblies, which hold political and administrative powers,⁸⁸ may make the commitment of participation (i.e. to participate in an HIA Consortium), and a commitment to support the ERPA by adopting a “development plan” (i.e. landscape management plan or HIA Management Plan) to such purpose in accordance with § 10.4 (a) of the Local Government Act of 1993. Additionally, the Regional Houses of Chiefs may transpose similar commitments through a Standing Order as provided under section 4 of the Chieftaincy Act of 2008 or through such means as found opportune according to customary law.

As the GoG (through the JCC and PMU) will mandate independent, privately organized institutions or organizations, in particular community, private sector, and NGO, to manage and operate program implementation or parts thereof in the HIAs, dedicated horizontal memorandums of understanding between the PMU and the Implementation Partners Consortium, including its private sector, civil society, government partners, as well as the Governance Board stakeholders (traditional authority, communities, farmers), and subject to approval by the GCFRP JCC, may be concluded. Such practice could well be modeled on the existing CREMA benefit sharing agreements which are concluded by member beneficiaries of the CREMA, authorized by the Minister (MLNR), and to be supported under law through the expected passage of the National Wildlife Resources Management Bill.

18. DATA MANAGEMENT AND REGISTRY SYSTEMS

18.1 Participation under other GHG initiatives

⁸⁸ Local Government Act 1993, § 10.1.

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Please indicate whether the ER Programme, or any part of the ER Programme, has transferred, or is planning to transfer, any ERs to any other GHG Mitigation Initiative. This would include parts of the Accounting Area that are registered or are seeking registration under project level standards such as the CDM or the VCS.

Please also indicate any actions that might not be included in the ER Programme but which could address the drivers of deforestation within the Accounting Area and that have transferred, or are planning to transfer, emission reductions to other GHG Mitigation Initiatives (i.e., improved cook stoves programmes under the CDM).

Where the ER Programme, or any part of the ER Programme, has been registered under any other GHG Mitigation Initiative, provide the registration number(s) and details for each of these.

During the first phase of the programme, the GCFRP will prioritise the transfer of ERs to the Carbon Fund in order to fully fulfil the terms of the ERPA to be negotiated for the programme. Any additional ERs generated from the programme will be utilised to support the attainment of targets under Ghana's Nationally Determined Commitments (NDCs).

Establishment of forest plantations under the National Forest Plantation Development Programme (NFPDP) holds promise for contributing to removals GCFRP. Ghana will utilise forest plantations established in the Accounting Area under the NFPDP to contribute towards the generation of ERs for programme. The only exception will be the plantations established by Form Ghana, a private forest plantation developer involved in large scale tree plantation establishment in the Asubima Forest Reserve in the Ashanti Region. Form Ghana's project in the Ashanti region has earned validation and is presently seeking registration under the VCS.

Ghana is currently finalising two (2) Nationally Appropriate Mitigation Actions (NAMAs⁸⁹) whose implementation will contribute to emission reductions from woodfuel. Though not considered to be a major driver of deforestation or degradation within the GCFRP area, woodfuel extraction for energy use is considered to be a modest drivers of forest degradation and has therefore been incorporated in the forest reference level as one of the elements to be measured for assessment of ERs. Implementation of the NAMAs is envisaged to take place in three out of the five regions of the Programme Accounting Area – Eastern, Ashanti and Brong-Ahafo regions.

With a monitoring system fully set up for the ER programme well in advance of the implementation of the NAMAs and other GHG emissions reduction initiatives, Ghana will explore the possibility of aligning all interventions including the NAMAs towards contributing to the targets of the ER programme. If any practical difficulties arise which may preclude the incorporation of ERs from the NAMAs or other interventions, these ERs will be deducted from the total in the Accounting Area.

18.2 Data management and Registry systems to avoid multiple claims to ERs

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Please indicate how the ER Programme works with the host country to select an appropriate arrangement to avoid having multiple claims to an ER Title. Discuss the choice and implementation of a Programme and Projects Data Management System and how this meets the requirements of the Methodological Framework.

⁸⁹ The NAMAs are: 1. Access to Clean Energy through Establishment of Market-based Solutions in Ghana; and 2. NAMA action on Sustainable Charcoal Supply Chain.

In addition please indicate how the ER Programme will ensure that any ER from REDD+ activities under the ER Programme are not generated more than once; and that any ER from REDD+ activities under the ER Programme sold and transferred to the Carbon Fund are not used again by any entity for sale, public relations, compliance or any other purpose. Discuss the choice and implementation of an ER transaction registry and how this meets the requirements of the Methodological Framework.

*Refer to **criteraion 37 and 38** of the Methodological Framework*

Ghana is in the process of developing a data management system for the GCFRP that will serve as central point for all key data related to the programme so as to ensure that all data is documented and centrally administered so as to avoid multiple claims to ERs. The data management system will collect information related to ERs attributable to the programme, safeguard information articulated in the ESMF, data on climate-smart cocoa production and other key activity parameters to inform impact assessments and to enable roll-out of Ghana's landscape cocoa standard, data about stakeholders and participants to support general administration and the eventual sharing/access to benefits (both direct and indirect), and information related to financial investments, roles, and responsibilities.

Currently, Ghana has developed a climate change data hub which is hosted and administered by the Environmental Protection Agency (EPA) of Ghana. Access to the online data hub is through the url address www.climatedatahubgh.com. The climate change data hub serves as a one-stop electronic platform where the general public and other technical users can get reliable up-to-date information on climate actions and their associated emissions reductions in the country. Data from the programme's data management system will then be transferred to the climate change data hub to enable open communication and transparency about impacts of the GCFRP, and integration with Ghana's NDC, and communication/registration to the CF

The data hub has three portals – a portal for GHG emissions (designated as GHG-D on the hub), domestic electronic registry system portal (DERS) and a policy and measure portal (PAMs). The GHG portal contains information on activity data and emission factors that are used for the estimation of GHG emission for 5 economic sectors covering the period 1990-2012. The DERS contains information on 91 climate related initiatives including AFOLU activities. The information covers the scope, sources of finance, status, channel of inflows etc. of the initiatives. The portal on PaMs is dedicated to host information on climate and development related policies and measures. Ghana intends to create three new portals with one dedicated to GCF projects, the other for Ghana's NDCs and the third for the GCFR Programme (i.e. ER programme).

For administration of the system, the plan is to have a sub-webmaster/ Registry specialist who is based at the National REDD+ Secretariat to administer the GCFR programme portal on the data hub. The sub-webmaster will also serve as a liaison between the NRS and the central webmaster of the Climate Data Hub based at EPA and thereby facilitate the exchange of information between the NRS and the EPA

In order to ensure that information is disseminated to decentralized levels, for example to rural local communities, an easy-to-use mobile app will be developed and deployed for use by farmers and other community members.

Ghana acknowledges the importance of setting up a transaction registry to ensure that all ERs from the programme are not generated more than once. However, Ghana does not envisage several emissions

transactions during the lifetime of the ERPA with the Carbon Fund and therefore intends to set up a fairly simple transaction registry that will document only the ERs transferred to the Carbon Fund. This registry will in turn offer lessons for the design of a complex system for tracking transactions when Ghana commences full-scale implementation of its NDC in the 2020s, at which time that there is anticipation of multiple transactions. Each ER to be generated from the programme will have a unique code linked to the HIA or a specific location (if it's outside the HIA). This arrangement will prevent double counting of the ERs traded with the Carbon Fund in any future transaction. All ERs transferred to the Carbon Fund will be retired upon expiry of the ERPA.

Audit of the data management and registry systems will be done periodically to cover the following:

1. To determine whether the system is working efficiently – in terms of security and system performance;
2. Whether or not the system has experienced any major failures and challenges and how those challenges have been rectified;
3. Whether or not there are major changes in the set-up of the systems and the extent to which that modification has led to the efficient functioning of the system; and
4. Whether or not the design protocols are being adhered to (i.e. the SOPs; how to upload data) and also if the skills set for manpower are sufficient to effectively administer the system.

ANNEXES

Annex 1: Overview of interventions and activities

A. Institutional Coordination and MRV	
1.	Operationalizing Joint Coordinating Committee (JCC)
1.1	Agree JCC roles and targets for Ghana Cocoa Forest REDD+ Programme implementation
1.2	Secure and maintain high-level government endorsement for GCFRP
1.3	Approval of overall/annual planning of the GCFRP implementation
1.4	Financial oversight of the GCFRP
1.5	Coordinate Inter-government collaboration and communication
2.	Establish and support operations of Programme Management Unit (PMU)
2.1	Establish and maintain PMU operations (office, equipment, vehicles, running costs)
2.2	Recruit PMU staff
2.3	Prepare GCFRP annual plans and implementation reports
2.4	Execute implementation agreements and supervise GCFRP annual plans
2.5	Coordinate discussions for additional REDD+ and CSC finance
2.6	Coordinate GCFRP MRV, safeguards and data management operations
3.	GCFRP activity monitoring/MRV/Data management system
3.1	Update and implement FRL/MRV
3.2	Monitoring activity implementation performance in HIA
3.3	Operate and maintain data management systems for GCFRP (safeguards, cocoa production, ERs)
3.4	Link to national NDC/UNFCCC (national communications)
4.	Law enforcement of GCFRP area
4.1	Support FC to reduce illegal activities (galamsey, chainsaw, bushfire)
5.	Creation of CSC Hotspot Intervention Areas
5.1	Entry level community engagements and key stakeholder meetings in target HIAs
5.2	Negotiations leading to formal decision to form HIA for CSC with due FPIC processes
5.3	Develop HIA governance structures and constitutions
5.4	Achieve key governance HIA decisions on CSC, ER and financial agreements
5.5	Ensure appropriate stakeholder communications of HIA progress
A. TOTAL (US\$)	

B. Landscape Planning within HIA areas	
1.	Establish CSC consortium for each HIA
1.1	Engage key stakeholders (LBCs, CSO, farmers associations, government)
1.2	Conclude formal agreements with clear roles and responsibilities of the consortium partners
2.	Complete HIA landscape management plans
2.1	Map farms, reserves and other land uses
2.2	Analyze HIA land uses and deforestation/degradation/enhancement areas
2.3	Negotiate CSC options and strategies for reducing emissions within HIA
2.4	Draft landscape management plan for each HIA
2.5	Public review and validation of HIA landscape management plans
3.	Implement HIA landscape management plans
3.1	Conduct awareness/training on CSC with community leaders and opinion makers
3.2	Conduct regular patrols of the HIA and confirm land use changes as part of MRV
3.3	Undertake land-use enhancement activities together with HIA leadership and FC
3.4	Negotiate grandfathering arrangements for irregular land uses
4.	Establish CSC landscape level validation in HIAs—CSC Sustainability Standard
4.1	Agree criteria and parameters for CSC validation protocol and Standard
4.2	Test draft CSC validation protocol in 1 HIA and revise
4.3	Implement revised CSC validation protocol across the GCFRP
4.4	Third party auditing and verification
TOTAL (US\$)	

C. Increasing Yields via CSC	
1.	Ghana CSC Good-practices guidelines (on-farm and off-farm)
1.1	Establish an expert working group, led by Cocobod
1.2	Review existing best practice recommendations for yield increases, sustainability, and climate-smart
1.3	Draft guidelines that include on-farm and off-farm elements.
1.4	Share draft guidelines with stakeholders (including HIA consortium partners) and hold consultations for input and comments.
1.5	Agree on guidelines for on-farm good-practices for Ghana's CSC.
1.6	Consortiums apply in HIAs
2.	CSC farmer engagement package in HIAs
2.1	Negotiate distribution of package with HIAs consortium stakeholders
2.2	Access to planting materials

2.3	Access to inputs
2.4	Access to technical extension
2.5	Access to business extension
2.6	Access to financial and risk products (credits and insurance)
2.7	Access to shade-tree planting material/promotion to assist natural regeneration
2.8	Premium price on CSC bean
3.	HIA CSC consortium implement with cocoa farmers (consortium vary by HIA)
3.1	Farmers receive Free-prior information about CSC programme criteria, responsibilities and benefits
3.2	Register farmers and implement CSC package
3.3	Farmers receiving training and access to incentives and benefits through the engagement package
3.4	Farmers who fail to comply lose access to the package and associated benefits.
4.	Increase transparency in cocoa purchases
4.1	HIA Consortium members ensure that cocoa farmers are paid for the beans that they produce.
4.3	HIA Consortium members ensure that purchasing clerks are fairly compensated.
4.2	Spot checks are used to monitor compliance
C. TOTAL (US\$)	

D. Risk management/finance	
1.	Access to financial credit for CSC
1.1	Map existing credit channels for CSC farmers
1.2	Stimulate new credit programmes within existent finance institutions
1.3	Create new facility/fund to develop innovative business approach for CSC
1.4	Explore loan guaranties
2.	Access to yield insurances
2.1	Access historical yield and weather data
2.2	Identify insurances companies interested in assessing and developing a product for Ghana's CSC
2.3	Guarantee funds for insurance premium payments for short-term (piloting) and long-term
2.4	Pilot and test CSC's insurance product in 1 HIAs
2.5	Implement the insurance product across GCFRP
3.	Marketing additional ERs above FCPF
3.1	Assess additional opportunities for accessing REDD+ finance
3.2	Package and present the GCFRP to potential investors and funders
3.3	Additional long term funds secured for the GCFRP
4.	Branding ER Cocoa/marketing
4.1	Develop market studies and demand for Ghana's CSC
4.2	Design and develop Ghana's CSC brand
4.3	Stimulate demand and sell Ghana's CSC
5.	Sustainable Finance of HIAs
5.1	Identify diverse long-term financial sources to support HIA governance

5.2	Plan and develop financial plan for HIA governance
5.3	Support start-up costs of HIA financial plan for 5 years
5.4	Establish trust fund with 3rd party financial management
5.5	Implement financial sustainability for HIA
TOTAL (US\$)	

E. Legislative and Policy Reform	
1.	Passage of legislation
1.1	Ensure passage of Forest Wildlife Bill legislative instrument
1.1.1	Support parliamentary sub-committee engagements leading to LI passage
2	Policy Reform and guidance to implementation of government policies
2.1	Tree-tenure reforms
2.1.1	All HIAs are approved to pilot new tree-tenure arrangements (tree passport and tree benefit sharing reforms)
2.1.2	Independent studies within HIAs on tree-tenure arrangements
2.1.3	Prepare tree-tenure policy implementation guidelines
2.2	Clarification of carbon transaction rights + benefit-sharing agreements for GCFRP
2.2.1	Independent studies on transaction rights at multiple scales and benefit-sharing agreements
2.2.2	All HIAs approved to innovate carbon transaction and benefit-sharing agreements
2.2.3	Independent review on innovative carbon transactions
2.3	Reform of Cocoa Farm input system
2.3.1	All HIAs are approved to pilot farm input reforms
2.3.2	Independent review on farm input pilots
3.	Modification to customary norms and practices
3.1	Promote evolution away of perverse traditional land-use practices at Cocoa sector
3.1.1	Independent studies in HIAs to identify perverse land use norms
3.1.2	Support negotiation with traditional leaderships for HIAs level reforms
3.1.3	Independent review on implementation of land use reforms
B. TOTAL (US\$)	

Annex 2a: Summary of financial plan

ITEM	DESCRIPTION	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Costs related to administrative oversight of the ER Program	Items A1 & A2, Set-up of the JCC and the PMU	\$ 1,402,600	\$ 656,700	\$ 664,995	\$ 673,705	\$ 682,850	\$ 4,080,850
Operational and implementation costs related to the actions and interventions that are part of the ER Program	Items A4 & A5: Law Enforcement and Identification of CSC Hotposts	\$ 1,065,000	\$ 1,120,000	\$ 1,120,000	\$ 1,120,000	\$ 620,000	\$ 5,045,000
(add separate rows for each of the ER Program Measures identified in section 4.3)	B. Landscape Planning within HIA areas	\$ 2,098,300	\$ 4,067,700	\$ 3,459,000	\$ 3,495,700	\$ 3,345,700	\$ 16,466,400
	C. Increasing Yields via CSC	\$ 24,300,000	\$ 24,070,000	\$ 24,070,000	\$ 24,070,000	\$ 24,070,000	\$ 120,580,000
	D. Risk management/finance	\$ 260,000	\$ 520,000	\$ 50,590,000	\$ 280,000	\$ 280,000	\$ 51,930,000
	E. Legislative and Policy Reform	\$ 120,000	\$ 100,000	\$ 235,000	\$ 140,000	\$ 150,000	\$ 745,000
Financing costs (e.g., interest payments on loans)		N/A	N/A	N/A	N/A	N/A	
Costs related to development and operation of the Reference Level and Forest Monitoring System;	Items A3: GCFP activity monitoring/MRV/Data management system	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 100,000	\$ 500,000
Costs related to the Implementation of Benefit Sharing Plan and relevant Safeguard Plan(s)		TBD	TBD	TBD	TBD	TBD	
Costs related to the implementation of the feedback and grievance redress mechanism(s);		TBD	TBD	TBD	TBD	TBD	
Costs related to stakeholder consultations and information sharing		TBD	TBD	TBD	TBD	TBD	
Other costs							
TOTAL		\$ 29,345,900	\$ 30,634,400	\$ 80,238,995	\$ 29,879,405	\$ 29,248,550	\$ 199,347,250

Annex 2b: Programme Budget Notes

#	Activity	Total	Notes
A. Institutional Coordination and MRV		\$ 9,625,850	
1	Operationalizing Joint Coordinating Committee (JCC)	\$ 555,000	
1.1	Establish JCC		See budget detail
1.2	Agree JCC roles and targets for Ghana Cocoa Forest Programme (GCFP) implementation	\$ 100,000	4 meetings/year @ \$5K USD each
1.3	Secure and maintain high-level government endorsement for GCFP	\$ 250,000	Annual support budget
1.5	Coordinate Inter-government collaboration and communication	\$ 50,000	Estimate
2	Establish and support operations of Programme Management Unit (PMU)	\$ 3,525,850	
2.1	Establish and maintain PMU operations (office, equipment, vehicles, running costs)	\$ 1,852,800	See budget detail
2.2	Recruit PMU staff	\$ 1,673,050	1@60K, 2@25K, 6@12K+5% increment
3	GCFP activity monitoring/MRV/Data management system	\$ 500,000	
4	Law enforcement of GCFP area	\$ 4,100,000	
4.1	Support FC to reduce illegal activities (galamsey, chainsaw, bushfire)	\$ 4,100,000	
5	Creation of CSC Hotspot Intervention Areas	\$ 945,000	
5.1	Entry level community engagements and key stakeholder meetings in target HIAs	\$ 600,000	\$100/meeting X 200 Communities/HIA
5.2	Negotiations leading to formal decision to form HIA for CSC with due FPIC processes	\$ 225,000	15 meetings @ \$2,500 each per HIA
5.3	Develop HIA governance structures and constitutions	\$ 120,000	\$20K/HIA
B. Landscape Planning within HIA areas		\$ 16,466,400	
1	Establish CSC consortium for each HIA	\$ 120,000	
1.1	Engage key stakeholders (LBCs, CSO, farmers associations, government)	\$ 60,000	10,000/HIA
1.2	Conclude formal agreements with clear roles and responsibilities of the consortium partners	\$ 60,000	Estimate
2	Complete HIA landscape management plans	\$ 1,608,000	
2.1	Map farms, reserves and other land uses	\$ 1,200,000	\$200K/HIA frontloaded in year 1 @ 60%
2.3	Negotiate CSC options and strategies for reducing emissions within HIA	\$ 120,000	\$20K/HIA frontloaded in year 1 @ 60%
2.4	Draft landscape management plan for each HIA	\$ 240,000	\$20K/HIA each in years 1 & 2
2.5	Public review and validation of HIA landscape management plans	\$ 48,000	2 meetings per HIA @\$2K each
3	Implement HIA landscape management plans	\$ 13,638,400	

#	Activity	Total	Notes
3.1	Conduct awareness/training on CSC with community leaders and opinion makers	\$ 450,000	\$25K/HIA, years 1,2, & 4
3.2	Conduct regular patrols of the HIA and confirm land use changes as part of MRV	\$ 2,738,400	See budget details
3.3	Undertake landuse enhancement activities together with HIA leadership and FC	\$ 450,000	Estimate
3.4	Negotiate grandfathering arrangements for irregular land uses	\$ 10,000,000	
4	Establish CSC landscape level validation in HIAs	\$ 1,100,000	
4.1	Agree criteria and parameters for CSC validation protocol	\$ 100,000	VCS grant likely
4.2	Test draft CSC validation protocol in 1 HIA and revise	\$ 200,000	
4.3	Implement revised CSC validation protocol across the GCFP	\$ 600,000	
4.4	Third party auditing and verification	\$ 200,000	Estimate
C. Increasing Yields via CSC		\$ 120,580,000	
1	Ghana CSC Good-practices guidelines (on-farm and off-farm)	\$ 180,000	Estimate
1.1	Establish an expert working group, led by Cocobod	\$ 100,000	Estimate
1.2	Review existing best practice recommendations for yield increases, sustainability, and climate-smart	\$ 80,000	Estimate
2	CSC farmer engagement package in HIAs	\$ 150,000	
2.1	Negotiate distribution of package with HIAs consortium stakeholders	\$ 150,000	
3	HIA CSC consortium implement with cocoa farmers (consortium vary by HIA)	\$ 120,000,000	
3.2	Register farmers and implement CSC package	\$ 120,000,000	estimated cost of \$25USD/hectre
4	Increase transparency in cocoa purchases	\$ 250,000	
4.2	Spot checks are used to monitor compliance	\$ 250,000	Estimate
D. Risk management/finance		\$ 51,930,000	
1	Access to financial credit for CSC	\$ 50,050,000	
1.1	Map existing credit channels for CSC farmers	\$ 25,000	
1.2	Stimulate new credit programs within existent finance institutions	\$ 25,000	
1.3	Create new facility/fund to develop innovative business approach for CSC	\$ 50,000,000	
2	Access to yield insurances	\$ 200,000	
3	Marketing additional ERs above FCPF	\$ 160,000	
3.1	Assess additional opportunities for accessing REDD+ finance	\$ 30,000	Estimate
3.2	Package and present the GCFP to potential investors and funders	\$ 30,000	Estimate

#	Activity	Total	Notes
3.3	Additional long term funds secured for the GCFP	\$ 100,000	
4	Branding ER Cocoa/marketing	\$ 290,000	
4.1	Develop market studies and demand for Ghana's CSC	\$ 30,000	
4.2	Design and develop Ghana's CSC brand	\$ 60,000	
4.3	Stimulate demand and sell Ghana's CSC	\$ 200,000	
5	Sustainable Finance of HIAs	\$ 1,230,000	
5.1	Identify diverse long-term financial sources to support HIA governance	\$ 30,000	
5.2	Plan and develop financial plan for HIA governance	\$ 30,000	
5.3	Support start-up costs of HIA financial plan for 5 years	\$ 450,000	
5.4	Establish trust fund with 3rd party financial management	\$ 600,000	
5.5	Implement financial sustainability for HIA	\$ 120,000	
E. Legislative and Policy Reform		\$ 745,000	
1	Passage of legislation	\$ 220,000	
1.1	Ensure passage of Forest Wildlife Bill legislative instrument	\$ 100,000	
1.2	Support parliamentary sub-committee engagements leading to LI passage	\$ 120,000	
2	Reform and implementation guidance of government policies	\$ 270,000	
2.1.1	All HIAs are approved to pilot new tree-tenure arrangements	\$ 20,000	
2.1.2	Independent studies within HIAs on tree-tenure arrangements	\$ 50,000	
2.1.3	Prepare tree-tenure policy implementation guidelines	\$ 30,000	
2.2.1	Independent studies on transaction rights at multiple scales and benefit-sharing agreements	\$ 80,000	
2.2.2	All HIAs approved to innovate carbon transaction and benefit-sharing agreements	\$ 20,000	
2.2.3	Independent review on innovative carbon transactions	\$ 30,000	
2.3.1	All HIAs are approved to pilot farm input reforms	\$ 20,000	
2.3.2	Independent review on farm input pilots	\$ 20,000	
3	Modification to customary norms and practices	\$ 255,000	
3.1.1	Independent studies in HIAs to identify perverse land use norms	\$ 30,000	
3.1.2	Support negotiation with traditional leaderships for HIAs level reforms	\$ 200,000	
3.1.3	Independent review on implementation of land use reforms	\$ 25,000	
GRAND TOTAL		\$ 199,347,250	

Annex 2c: Initial Discounted Cash Flow Analysis

Assumptions					
Productivity					
Current Productivity	400	kg/hectare			
Increase in yields	50% achieved in year 2, 100% thereafter				
Farmgate Cocoa price	6800.00	GHC/tonne			
	6.80	GHC/kg			
World Cocoa Price	\$ 3,100	USD/tonne			
	\$ 3.10	USD/kg			
% World price to Cocoa Board	30%				
Exchange rate	4.000	GHC/USD			
Hectares in programme	800,000	hecatres			
Carbon price	\$10	USD/tonne			
Estimated Ers	1,057,500	tonnes/year			
Productivity (kg/hectare) =	400				
Year	1	2	3	4	5
Revenue					
Emissions reductions (\$10/tonne)	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000
Increase yield farmers		\$0	\$0	\$0	\$0
Increase yield to Cocoa Board		\$0	\$0	\$0	\$0
Total Revenue	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000
Programme Expenditure	(\$29,345,900)	(\$30,634,400)	(\$80,238,995)	(\$29,879,405)	(\$29,248,550)
Net flows	(\$18,770,900)	(\$20,059,400)	(\$69,663,995)	(\$19,304,405)	(\$18,673,550)

IRR	N/A - negative return				
NPV* @ 10%	(\$110,762,035)				
@20%	(\$86,701,457)				
@30%	(\$69,805,651)				
*The % are an expected rate of return from an investment perspective					
Productivity (kg/hectare) =	600				
Year	1	2	3	4	5
Revenue					
Emissions reductions (\$10/tonne)	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000
Increase yield farmers		\$136,000,000	\$272,000,000	\$272,000,000	\$272,000,000
Increase yield to Cocoa Board		\$74,400,000	\$148,800,000	\$148,800,000	\$148,800,000
Total Revenue	\$10,575,000	\$220,975,000	\$431,375,000	\$431,375,000	\$431,375,000
Programme Expenditure	(\$29,345,900)	(\$30,634,400)	(\$80,238,995)	(\$29,879,405)	(\$29,248,550)
Net flows	(\$18,770,900)	\$190,340,600	\$351,136,005	\$401,495,595	\$402,126,450
IRR	1087.93%				
NPV* @ 10%	\$927,971,285				
@20%	\$674,970,354				
@30%	\$506,892,751				
*The % are an expected rate of return from an investment perspective					
Productivity (kg/hectare) =	800				
Year	1	2	3	4	5

Revenue					
Emissions reductions (\$10/tonne)	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000
Increase yield farmers		\$272,000,000	\$544,000,000	\$544,000,000	\$544,000,000
Increase yield to Cocoa Board		\$148,800,000	\$297,600,000	\$297,600,000	\$297,600,000
Total Revenue	\$10,575,000	\$431,375,000	\$852,175,000	\$852,175,000	\$852,175,000
Programme Expenditure	(\$29,345,900)	(\$30,634,400)	(\$80,238,995)	(\$29,879,405)	(\$29,248,550)
Net flows	(\$18,770,900)	\$400,740,600	\$771,936,005	\$822,295,595	\$822,926,450
IRR	2220.60%				
NPV* @ 10%	\$1,966,704,606				
@20%	\$1,436,642,164				
@30%	\$1,083,591,154				
*The % are an expected rate of return from an investment perspective					
Productivity (kg/hectare) =	1000				
Year	1	2	3	4	5
Revenue					
Emissions reductions (\$10/tonne)	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000
Increase yield farmers		\$408,000,000	\$816,000,000	\$816,000,000	\$816,000,000
Increase yield to Cocoa Board		\$223,200,000	\$446,400,000	\$446,400,000	\$446,400,000
Total Revenue	\$10,575,000	\$641,775,000	\$1,272,975,000	\$1,272,975,000	\$1,272,975,000
Programme Expenditure	(\$29,345,900)	(\$30,634,400)	(\$80,238,995)	(\$29,879,405)	(\$29,248,550)
Net flows	(\$18,770,900)	\$611,140,600	\$1,192,736,005	\$1,243,095,595	\$1,243,726,450

IRR	3345.92%				
NPV* @ 10%	\$3,005,437,926				
@20%	\$2,198,313,975				
@30%	\$1,660,289,556				
*The % are an expected rate of return from an investment perspective					
Productivity (kg/hectare) =	1200				
Year	1	2	3	4	5
Revenue					
Emissions reductions (\$10/tonne)	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000	\$10,575,000
Increase yield farmers		\$544,000,000	\$1,088,000,000	\$1,088,000,000	\$1,088,000,000
Increase yield to Cocoa Board		\$297,600,000	\$595,200,000	\$595,200,000	\$595,200,000
Total Revenue	\$10,575,000	\$852,175,000	\$1,693,775,000	\$1,693,775,000	\$1,693,775,000
Programme Expenditure	(\$29,345,900)	(\$30,634,400)	(\$80,238,995)	(\$29,879,405)	(\$29,248,550)
Net flows	(\$18,770,900)	\$821,540,600	\$1,613,536,005	\$1,663,895,595	\$1,664,526,450
IRR	4469.14%				
NPV* @ 10%	\$4,044,171,247				
@20%	\$2,959,985,786				
@30%	\$2,236,987,959				
*The % are an expected rate of return from an investment perspective					

Annex 3: Request for Exemption and Justification for 2015 Reference Period end date

Ghana requests an exemption from the Carbon Fund limitation of 2013 as the latest end date for a Reference Period (Criterion 11; Indicator 11.1). Ghana has experienced increasing deforestation in the years following 2012, and its period of performance under a REDD+ program would not start prior to 2017. There have been steep rises in rates of deforestation, largely attributable to a major upsurge in the incidence of wildfires, illegal logging, and illegal mining in the GCFRP Accounting Area, especially during 2013 and 2014. Therefore, a reference period ending in 2012 does not adequately represent the actual rate of deforestation and forest degradation that has been occurring in recent years, and therefore serves as an inadequate representation of historical emissions. Ghana has the capacity, Government commitment and opportunity to reduce emissions from deforestation while preserving important habitats. However, forcing Ghana to take a reference level that will likely ensure failure will have broad-reaching negative consequences.

This reality of rapidly rising deforestation emissions is reflected in the analyses forming the basis of the reference level presented in this ER-PD as well as in local knowledge and global data. Figure A1 displays annual area of deforestation in the GCFRP Accounting area derived both by the imagery analysis of Ghana and from the global analyses of the University of Maryland (<http://glad.umd.edu/>). The analysis strongly demonstrates the recent increases in forest pressures in the GCFRP Accounting Area.

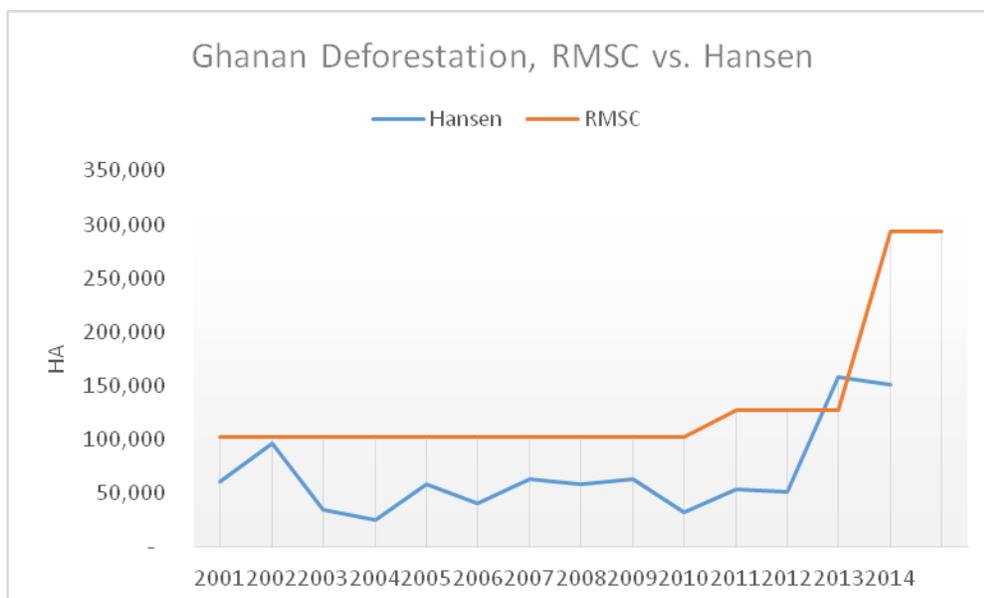


Figure 20 Annual deforestation in the GCFRP Accounting Area of Ghana as derived by the analyses of Ghana's Forestry Commission and by the Global Land Analysis & Discovery team of the University of Maryland

The analysis demonstrates that deforestation emissions between 2013 and 2015 were more than double those recorded between 2000 and 2010. Emissions even rose 23% from 2010-2013 to 2013-2015.

This discrepancy poses significant challenges in achieving emission reduction benefits under a REDD+ program. Even assuming the deforestation rate does not continue to climb, Ghana would have to decrease its deforestation by 37% even if the reference period continues through 2015. If the period were limited to 2012 Ghana would have to reduce its emissions by almost 50% before a single emission reduction credit could be earned. This reality may severely undermine the program's potential for success and render it a non-starter.

Table A47 below shows the options for calculating average annual deforestation. The final column shows the proportional reduction needed prior to eligibility for crediting and clearly illustrates the importance of a later end date for Ghana’s reference period.

Table 476: Options for reference periods with accompanying deforestation rates

Reference Period	Reason	Annual Average (t CO ₂ e/yr)	Difference (t CO ₂ e/yr)	Needed Reduction Prior to Crediting (%)
2013-2015	Most recent data	53,410,328	-	-
2000-2012	Methodological Framework	21,006,742	32,403,586	61%
2000-2015	Proposed Reference Period	27,279,790	26,130,538	49%

As such, Ghana requests an alteration in the dates of the reference period for the calculation of the average historical emissions to more closely reflect land use and land use change dynamics

Annex 4: Letter of Support

Submitted separately to FCPF.

Annex 5: Stakeholder Consultation

Event	Stakeholders/ Participants	Issues/Presentation	Comments /Question	Feedback/Responses
<p><i>ERP Information Sharing and Kick-Off for High Level Stakeholders, March 4th, 2015, Fiesta Royale Hotel, Accra.</i></p>	<p>Parliament, MLNR, MESTI, MOFA, COCOBOD, CRIG, FC, FORIG, Mondelez Cocoa Life, Armajaro, Touton, NCRC, Solidaridad, Rainforest Alliance, National House of Chiefs, SNV, Agro Eco, IUCN, Olam</p>	<p>Overview of Ghana’s National REDD+ Strategy, Emission Reduction Program and Incorporation of REDD+ Within FC - <i>Yaw Kwakye & Edith Abruquah</i>; Ghana Cocoa Board’s Climate Smart Cocoa Strategy and The ERP – <i>Dr. Anim Kwapong</i>; Facilitating climate smart Cocoa Production in Ghana - <i>Christian Mensah (Rainforest Alliance) and Isaac Gyamfi (Solidaridad West Africa)</i>; Olam’s interest in ERP: Growth Sustainability; Touton-PBC Cocoa Sustainability Program.</p>	<p>Why so much overlap between the FIP and the ERP? How are these programs working together and how are they different?</p>	<p>The FIP area is falls within the ERP area and share the same objectives. The two program areas are characteristics by the same drivers of deforestation and forest degradation. There are to synchronize work plan of the two programs to avoid duplication of efforts. Whiles the ERP is a performance based payment, the FIP is not. Rather, FIP sought to pilot readiness activities that would later be upscale to put Ghana in a position for implementation performance based payment ER Program.</p>
<p><i>Synergy between REDD+ and FLEGT/VPA with respect to Benefit Sharing, Legality and Safeguards, March 13th, 2015, Forestry Commission Auditorium, Accra.</i></p>	<p>FC, CRIG, MLNR, COCOBOD, NHC, FORIG, Solidaridad, COCOBOD, FC, Olam, Touton, IUCN, Ministry of Finance, MESTI</p>	<p>“Analysis of linkages and opportunities for synergies between FLEGT, REDD and national forest program in Ghana”. Four technical areas under investigation are: <i>Regulation of the domestic market; Benefit sharing; Legality & safeguards; and</i></p>	<p>Is there a way of institutionalizing coordination and capturing synergies between REDD+ and VPA with respect to benefit sharing, conflict resolution, and complaint mechanisms?</p>	<p>The GCFRP and REDD+ in general are synergistic with a number of other key initiatives like the VPA, FIP, etc. The JCC and the various sub-working groups represent efforts to ensure that there is serious institutional collaboration and coordination. For instance, on the NRWG and the Consultation and participation sub-working groups, there are representatives from FLEGT/VPA serving. In the same manner, the Head of the NRS also serve on the VPA Multi-stakeholder implementation Committee.</p>

		<p><i>Monitoring.</i> Overview REDD+ VPA FLEGT Synergy Program - <i>Samuel Nketia</i>; Benefit Sharing Framework For Ghana’s REDD+ Process - <i>Robert Bamfo</i>; Legality and Safeguards under FLEGT VPA and Areas of Synergy with REDD+ - <i>Kwame Oduro.</i></p>		
<p><i>Consultation with stakeholders implementing REDD+ activities across the country—REDD+ Finance Tracking Initiatives (REDDX), 23rd June, 2015, FC Auditorium, Accra.</i></p>	<p>MLNR, FC (CCU, FSD,WD), Olam Ghana, Hamilton Resources and Consulting, FORIG, Conservation Alliance, Ghana Integrity Initiative, IUCN, A Rocha Ghana, Portal Forest Estate, UNDP (GEF), Solidaridad, SNV, Rainforest Alliance, CERSGIS</p>		<p>How is the program addressing tree tenure?</p>	<p>It is apparent that planted trees on-farms are owned by the planter.</p>
			<p>How is it aiming to motivate farmers to plant trees and how will farmers stand to benefit?</p>	<p>Under FIP tree seedlings are being distributed freely to farmers, and education and sensitization on the non- carbon benefits including provision of micro climate, soil conservation and fertility improvement of trees on farm are being undertaken.</p>
			<p>How will ERP program engage all stakeholders, not just at high levels but also at the district and local level where the deforestation is taking place?</p>	<p>The program will have specific HIAs and in each intervention area there will be HIA consortium which will have a constitution, Management plan and district bye laws and the intervention area management board. The management board will be made up of the traditional authorities, village committees etc. There is already ERP stakeholder consultation plan.</p>
			<p>How would the sustainability of the ER program be guarantee</p>	<p>Non-carbon benefits are likely to be the most sustainable and important to farmers. The non-carbon benefit of E such increased yields, access to farming inputs, and rights to trees will drive the sustainability of the program.</p>
<p><i>Training for Staff of Ghana’s COCOBOD and FC</i></p>	<p>Participants were drawn from various departments, units</p>	<p>Ghana’s National REDD+ Architecture and the Readiness Processes– <i>Yaw</i></p>	<p>How will the benefits sharing mechanism and/or bonus payment system under the</p>	<p>This viewpoint, which was widely shared by COCOBOD participants, aligns with the logic of Ghana’s ERP and has informed the design of the program’s benefit</p>

<p><i>on the GCFRP, Sept 21-24, Aqua Safari, Ada, Ghana</i></p>	<p>and divisions of the COCOBOD (including the Research Monitoring and Evaluation Department (RMED), Seed Production Department (SPD), Cocoa Health and Extension Department (CHED) and the Cocoa Research Institute of Ghana (CRIG)). For FC, regional managers were selected from the Wildlife Division (WD) and the Forest Services Division (FSD).</p>	<p><i>Kwakye</i>; Examples of REDD+ Projects in Africa – <i>John Mason</i>; Status of REDD+ Markets – <i>Rebecca Ashley Asare</i>. Moving from projects to programs: evolving REDD+ finance – <i>John Mason</i>; Jurisdictional REDD+ issues: – <i>Tesfaye Gonfa</i>; Case Study on Oromia REDD+ Program, Ethiopia – <i>Tesfaye Gonfa</i>; Case Study on Brazil REDD+ program – <i>Rebecca Ashley Asare</i>; Co-benefits, Safeguards, and FPIC – <i>Hilma Manan</i>. Briefing on Ghana’s Cocoa Forests REDD+ program – <i>Yaw Kwakye</i>; Synergies between Cocoa Board Strategy and REDD+ program – <i>Mr. Eric Amengor</i>; Climate-smart cocoa: what is Ghana selling? – <i>Rebecca Ashley Asare</i>; How can Cocoa ER program be implemented on the ground? – <i>Rebecca Ashley Asare</i>.</p>	<p>COCOBOD inform the design of the Ghana’s ERP benefit sharing mechanism?</p> <p>What existing measures are in place particular on safeguards and for which lessons or experiences could be learnt to enhance the implementation of the ERP.</p>	<p>sharing mechanism.</p> <p>COCOBOD has extensive experience dealing with safeguard issues in its sector (e.g. child labor), as well as benefit sharing (bonuses). The Research, M&E Department of COCOBOD has the responsibility to monitor safeguard results and the staff on the ground are required to report as part of their results framework how safeguards issues are addressed. Again, CHED has developed best practices guideline for cocoa production. Lessons learnt are being incorporated into the design of ERP.</p>
<p><i>Community Consultation on Ghana's ERP at the Catholic</i></p>	<p>FC (CCU, FSD, WD), COCOBOD (CHED), National Forest Forum, Chiefs and</p>	<p>Climate Change and REDD+ - Meaning of Climate Change, Signs of Climate Change, Activities that</p>	<p>Provision of incentives such as mobile phones, stipend, bicycles, motorbikes and duty post will motivate the Forest</p>	

<p><i>Diocesan Pastoral and Social Center, Goaso in the Brong-Ahafo Region on 1st October, 2015</i></p>	<p>Cocoa Famers from 39 district within the Goaso forest district.</p>	<p>humans do to bring about Climate Change, Negative effects of Climate Change on human life, Tree protection and tree planting as a means to mitigate Climate Change - <i>Mr. Abaka Haizel</i>; Operational Measures for Climate Smart Cocoa Cultivation - <i>Mr. Tweneboah Koduah</i></p>	<p>Guards to efficiently check illegal logging; Farmers, they should be supplied with tree seedlings for planting; restrict the importation of chainsaw machines; FC should collaborate with COCOBOD and register cocoa farms that have been intercropped with trees since it is a means to increase their cocoa yields and also to contribute to emission reduction; provide extension services to the farmers</p>	
<p><i>Community Consultation on Ghana's ERP at Ench in the Forest District of the Western Region of Ghana, on 7th October, 2015</i></p>				<p>Unresolved tree tenure issues (Fear of planted trees being taken over and felled by TUC holders); More Cocoa Extension Officers needed to educate farmers on modern; Law enforcement - Forest Managers should be given the power to prosecute forest offences; political interference in forest management; CBOs (CFCs, CBAGs, CREMAS, NFFG, etc.) should be strengthened and made vibrant to support forest protection.</p>
<p><i>Community Consultation on Ghana's ERP at Owuram near Asamankese, Eastern Rgion of Ghana. 9th October, 2015</i></p>	<p>FC (WD, FSD),NFF,COCOBOD (SPD,CHED), MOFA, NADMO, Care International, Famers from the following communities (Yaw Basi Krom, Foaso Nkrankrom,</p>	<p>1. The role of forests in Ghana's Emission Reduction Program – <i>Mr. Attah Owusu, FSD-FC</i>. 2. The effect deforestation on wildlife population – <i>Mr. Bernard Asamoah-Boateng, WD-FC</i>. 3. Rehabilitation of Cocoa</p>	<p>How will the GCFRP change the BAU on the ground with respect to contractors felling trees without farmers' consent and not paying compensation, and farmers' inadequate access to seedlings and fertilizer? The situation is not good for farmers.</p>	<p>The ERP through stakeholder consultation at various levels including local communities has been sensitizing people particularly farmers on the legality of ownership of planted trees as well as the conditions under which contractors could fell trees on farms. The ERP learnt lessons from the free distribution of tree seedling and improved access to some farming inputs</p>

	<p>Odumase, Gyasikrom, Kasapim, Bitre Abeebrere, Manhyia, Atimponya, Kensere, Kwame Bour, Yaw Krakrom, Maanfadwen, Moseabo, Kodiekrom, Gambia, Ayomso etc.)</p>	<p>Farms outside Forest Areas – <i>Mr. Gyimah Gyamfi, CHED - COCBOD.</i> 4. Cultivation of Cocoa under shade: a potential means to mitigate global warming – <i>Dr. J.E. Sarfo, QCC-COCOBOB.</i></p>	<p>Gender considerations in REDD+ and the program should be stronger and clearer. How is gender being considered in REDD+ and in the design of the ERP?</p>	<p>Gender consideration are being given careful attention in the design of the ER Program. Under the readiness phase of REDD+, the Forestry Commission in collaboration with IUCN engaged several stakeholders towards ensuring that gender issues are mainstream in the design and implementation of any REDD+ program. The product of that collaboration in the design of a gender Road Map for REDD+ in Ghana. The roadmap guided gender considerations in the development of REDD+ Strategy.</p>
<p><i>Community Consultation on Ghana's ERP at Assin Fosu Forest District of the Central Region of Ghana. 13th October, 2015</i></p>		<p>Radio Talk Show Panelist: 1. Mrs Lucy Amoh Ntim - Assistant Regional Manager, FSD-FC. 2. Dr. Ofori Gyamfi, Regional Cocoa Health and Extension Division - COCOBOD. 3. Mr. Solomon Bagaseh, Regional Forestry Forum. 4. Mr. Samuel Essuman, CHED-COCOBOD.</p>	<p>Questions panelist sought to answer during the radio talk show include the following: What is climate change? What are the effects of climate change on the environment? How can climate change affect cocoa production? How can climate change be mitigated? What is the role of forest in mitigating climate change? Why should we encourage tree planting in the environment? What are the benefits in establishing tree plantation? Question asked during the actual consultative meeting are: participants asked whether contractors were made to plant trees to replace those that they remove? Do land lords have rights to sell trees on their farms without their notice?</p>	<ol style="list-style-type: none"> 1. Cocoa thrives well under shade than when it is left at the mercy of the sun. 2. Cocoa farmers should maintain some amount of shade on the cocoa trees to prolong its lifespan and increase production /yield. 3. Presence and maintenance of shade trees in cocoa farms help to control the spread of 'Akate' in cocoa farms. 4. Discourage the conversion of cocoa farmland to rubber plantation since cocoa has ready market and stable price as compared to rubber. 5. The need for effective collaboration between the FC, COCOBOD (CHED), Traditional Rulers, Land Owners, Farmers, NGOs, and CBOs for good result from the program. 6. There is also the need for periodic interaction with the media in the form of radio talk show on the state and local FM stations to educate the communities about the importance of trees. 7. There is the need to expand and cover the whole Central Region (including Twifo Praso, Dunkwa-on-Offin, Breman, Nyakrom) where there are cocoa and forest. 8. There is the need for a roadmap towards reaching

			What can forestry commission can do to save the destruction timber contractors cause to their cocoa farms without compensation under the position of "this is my TUC area". (answers to the above questions were not provided in the report)	out to all farmers in the region
<i>Community Consultation on Ghana's ERP at Bibiani in the Forest District of the Western Region of Ghana, held on 8th November, 2015</i>	stakeholders and participants at the event include representatives from the following: Forestry Commission, COCOBOD, MOFA, Bibiani Anwiaso Bekwai District Assembly, Farmers, NGOs and CSOs,			Unresolved tree tenure issues (Fear of planted trees being taken over and felled by TUC holders); More Cocoa Extension Officers needed to educate farmers on modern; Law enforcement - Forest Managers should be given the power to prosecute forest offences; political interference in forest management; CBOs (CFCs, CBAGs, CREMAS, NFFG, etc.) should be strengthened and made vibrant to support forest protection.
<i>REDD+ Strategy Multi-Stakeholder Consultation Workshop, Nov 5th, FC Auditorium, Accra</i>	Tropenbos, NFF, Censudi, Rise – Ghana, FORIG, MOFA, FC (Participants from the southern zone of the country: Central; Eastern; Greater Accra and Volta Regions.	Mr Kwame Adyei delivered on sections of Ghana's REDD+ Strategy: Overview of REDD+ in the world and Ghana's position in the REDD+ programme; Introduction to REDD+ Readiness towards implementation; Achieving REDD+; Governance and; Tracking REDD+.	How will the program address the lack of compliance with and enforcement of timber harvesting rules and regulations?	The program implementation will support national efforts towards passage of legislation, reform and implementation of government policies, modification to customary norms and practices
				The strategy should clearly indicate how to address land tenure issues, tree tenure issues and carbon right as they emerge.
				Wildfire should be part of the drivers especially considering the savannah ecological zone. The diagram showing drivers of deforestation and degradation needs to be expanded to cover other drivers aside from the five mentioned.

				On financing, focus has been on the international market, but we should also look at the local market for financing for example Agricultural Development Bank and some internally generated system to support the implementation of the program under the strategy.
<p><i>IUCN BMU REDD+ Benefit Sharing Project Learning Event, 9th - 11th November, 2015 at Aqua Safari Resort, Ada</i></p>	<p>MLNR, A Rocha Ghana, FORIG, Colandef, IUCN, FC (RMSC,FSD,WD), Portal Forest, Hamilton Resources, Civic Response, KASA Ghana, Tropenbos International</p>	<p>Component 1: Understanding and contextualizing: understanding the local/national context and the different factors involved. Component 2: Designing for Pilot - formulating concrete proposals, validating. Component 3: Mainstreaming - how the project mainstreams baseline and output from 1 and 2, and at which scale</p>	<p>Although individual landowners and land users do not have economic rights to naturally occurring trees, they do have the right to fell trees off-reserve during the land-clearing process and frequently nurture or eliminate species based upon their farming agenda and experiences. How will the program address this problem?</p>	
			<p>The current tree tenure system where the State owns all naturally-occurring trees and farmers have no ownership right over such economic trees in their farms, creates a disincentive for farmers to keep naturally economic trees in cocoa farms. How will the program address this problem</p>	<p>The ER Program is transformational and therefore seek to push for significant changes and reforms in the forestry sector policies and strategies which include issues of tree tenure.</p>

<p><i>SNV Knowledge Event on Ecosystem Services in Ghana's Cocoa Landscape, 12 November, 2015 Mensvic Hotel, East Legon Accra, Ghana.</i></p>		<p>Potential for enhancing on-farm tree tenure and carbon stocks; Pest and disease control; Nutrient cycling and pollination; Way forward with SNV's Sustainable Cocoa Landscape Program.</p>	<p>Landscape has low carbon stocks, hence, it has the high potential for accumulating carbon with the implementation of REDD+; Non-timber species are more dominant in the landscape; more trees do not necessarily translate into greater canopy cover as it is dependent on species and tree characteristics; Shade tree canopy coupled with modest fertilizer application can have a positive impact on yields under low input smallholder cocoa cultivation.</p> <p>Landscape has low carbon stocks, hence, it has the high potential for accumulating carbon with the implementation of REDD+; Non-timber species are more dominant in the landscape; more trees do not necessarily.</p>	
<p><i>National REDD+ Forum Held at the Accra International Conference Centre (AICC) on Wednesday 25th of November 2015</i></p>	<p>Dr. Ismael Yamson (Chairman – Yamson and Associates) H.E. John Agyekum Kuffuor (Former President and UN Special Envoy), Mr. Samuel Afari-Dartey (CEO, FC), Chief Executive Officer Dr. Stephen K. Opuni (CEO, COCOBOD) Hon. Nii Osah Mills (Minister, MLNR) Prof. John Nabilla (President – NHCs), Ms. Christine Evans-Klock, Country Rep. UNDP, Prof. Henry Kerali World Bank Country Director</p> <p>Key forest, REDD+ and other land use sector actors from the government institutions, private sector, NGOs, CSOs traditional authorities, community</p>	<p>The following presentations were delivered: National Efforts to Combat Climate Change, <i>by Mr. Peter Dery - MESTI</i></p> <p>REDD+: The State of Play in Ghana <i>by Mr. Robert Bamfo - FC</i></p> <p>Private Sector Participation in Addressing Climate Change <i>by Mr. Isaac Gyamfi – Solidaridad WA</i></p> <p>Mobilising Climate Finance in Ghana, <i>By Dr. Rebecca Ashley Asare, Nature Conservation Research Centre, Accra – NCRC.</i></p> <p>The Role of Traditional Leaders as Advocates for Climate Actions, <i>by Nana Frimpong Anokye Ababio – NHCs.</i></p> <p>Keynote address on the</p>	<p>Is there funding available for individuals for tree planting to help reduce emissions?</p>	<p>There are opportunities available for individuals to engage in plantation and funding for such programs. These activities should be seen as a business opportunity and Technical Assistance is provided to ensure trees grow in order to get returns. Trees shouldn't be seen only for timber. REDD+ ensures that the trees are maintained to help in carbon stocks enhancement.</p>
		<p>Law enforcement should be beefed up and any programs put in place to enforce environmental laws. REDD+ plans for climatic conditions and need to support and bring back traditional by-laws to sanction people who degrade the forest. African leaders should sit up and come up with policies to safeguard our environment.</p> <p>The continuous decline in forest cover is largely going to affect food and agricultural production and also going to jeopardize Ghana's longstanding position as an important supplier to the international timber market, thereby diminishing revenue from the import sector.</p> <p>The emergence of REDD+ in Ghana presents an opportunity for the country to further complement ongoing efforts towards the sustainable management and conservation of our forests.</p> <p>Ghana's readiness to tackle the drivers of deforestation and forest degradation will therefore benefit the poor. He indicated that, the inclusion of REDD+ in Ghana's INDC demonstrates the importance of REDD+ contribution to the world's efforts in addressing climate change. Success of REDD+ will not only mean reducing carbon emissions but healthier forests which will provide livelihoods for the poor.</p>		

	representatives, farmer groups, academia, development partners and students were among participants.	theme “ <i>Conserving our forests for better lives and a better climate</i> ” by H. E. John Agyekum Kuffour, former President of the Republic of Ghana and UN Special Envoy for Climate Change		
<i>The National REDD+ Strategy (NRS) Validation workshop 17th December, 2015 at the FC Auditorium, Accra.</i>			How does the program/strategy sought to address the challenge of land use planning; what are domestic sources of funds - the document did not stress on domestic financing;	The program will promote local level institutional coordination, stakeholder consultation and involvement in sub-national level land use planning. The development of an ER implementation plan which a consulting firm will be contracted to design will outline the various possible or funding or financing sources for implementing the ER Program and for that matter any the REDD+ program for Ghana.
			The document lacks strategic components such as setting ambitious carbon targets for the identified drivers of deforestation and forest degradation.	MRV has not been verified so setting our own targets will be difficult at this stage; Specific carbon targets cannot be provided now to due limitation in MRV - Implementation plan will provide specific details on carbon targets;
			Scope of REDD+ does not give much information on how biodiversity will be monitored. How is the issue of biodiversity conservation being addressed	We need to clearly define land use systems and land tenure in our Safeguards Information Systems
			How is cocoa strategy align with REDD+ strategy - there should be a close linkage.	The basic reason for the establishment and inauguration of the JCC between the FC and the COCOBOD is the general understanding that sustainability of cocoa production hinges on the sustainable management of forest. The Ghana National Cocoa Strategy II is at the draft stage of

				development. The strategy focus on climate smart cocoa production and sought to ensure combinations of cocoa trees and shade crops/trees that have both economic and environmental benefits. In fact, the cocoa strategy mention the collaboration between FC and COCOBOD in the ER Program and the FIP as current sustainability programs.
<i>Youth Event - REDD EYE</i>	Second cycle institutions, church youth groups, NGOs and Second cycle institutions including Amasaman Senior High, Presbyterian Boys Senior High School, Presbyterian Senior High School Mampong, Benkum Senior High School, Ideal College, Presett Pacesetters Senior High School and Life International Senior High School.	Message 1: Why should the youth be concerned about climate change? (Causes, manifestations and impacts of climate change) – <i>by Mrs. Saadia Bobtoya Owusu-Amofah</i> ; Message 2: Why does protecting our forests matter in addressing climate change? - <i>Mr. Kwame Mensah</i> ; Message 3: REDD+ and Ghana's progress in implementing the mechanism - <i>Ms. Hilma Manan</i> ; Message 4: The role of the youth in forest conservation: A case-study of A Rocha's campaign aimed at the conservation of the Atewa Range Forest Reserve - <i>Mr. Daryl Bosu</i> ;	How does Trees help to fight climate change? How do we benefit from not cutting trees for charcoal and export?	As trees grow, they help stop climate change by removing carbon dioxide from the air, storing carbon in the trees and soil, and releasing oxygen into the atmosphere; Trees can be cut for charcoal and export but it must done within the law and new seedlings must be planted to substitute the old ones.
<i>Multi-Stakeholder Project Inception Workshop:</i>	MLNR, FC, SNV, KASA, A Rocha Ghana, IUCN Ghana,	Introduction to REDD+ Safeguards and UNFCCC requirements: <i>by Linda</i>	Some key entry points at subnational level and activities for the target area include the	Some activities include the following: Background analyses (institutional/stakeholder, drivers, spatial); Safeguard review process; multi-stakeholder planning

<p><i>Operationalizing National Safeguards Requirement for Result Based Payment From REDD+. 10th March, 2016 at the Tulip in Hotel, Accra.</i></p>	<p>Climate Law and Policy</p>	<p><i>Rivera - Senior Legal and Policy Advisor; Introduction to Project Work Packages in designing a Country Approach to Safeguards and a SIS in Ghana: by Ugo Ribet - Legal and Policy advisor; Integrating Safeguards and Multiple Benefits into Subnational Activities: Lessons from SNV and proposed activities in Ghana: By Reuben Ottou,</i></p>	<p>following: Integrated Low Emission Development Plans; Relevant Policies and Measures; Benefit Distribution Systems; Participatory Forest Monitoring.</p> <p>How will REDD+ safeguard for Ghana maintain biodiversity and ecosystem service?</p>	<p>and review workshops; Integrating REDD+ and other land use related climate change mitigation strategies and actions into appropriate development planning; Explore trade-offs across multiple economic; Support integration of land use planning using a multi-stakeholder approach for adoption in HFZ; Support priority Policies and Measures to maximize co-benefits and meet safeguard requirements; Contributes to deepening the emerging institutional collaboration towards addressing commodity driven deforestation in Ghana’s cocoa-forest mosaic landscapes; Participatory approaches to monitoring (e.g. PFM).</p>
<p><i>Capacity Enhancement on Forest Reference Level/Measurement, Reporting and Verification System for REDD+ (MRV Training) 4th – 15th April, 2016 at the Forestry Commission Training Centre, Kumasi.</i></p>	<p>Ghana Cocoa Board, Forestry Commission (FSD, WD, NRS, RMSC) FORIG, Touton SA, Solidaridad West Africa</p>	<p>Presentation include the following: Proposed Forest Reference Level and Measurement Reporting and Verification Approaches for Ghana. <i>By Alex Grais and Gabriel Sidman - Ecosystem Services Unit, Winrock International;</i></p> <p>Application of standard operation Procedure (SOPs) developed by Indufor OY <i>by Dr. Carly Green and Mr. Juho Penttila</i></p>	<p>How are errors taken into consideration for projections of emissions and removals?</p> <p>What stratification of forest is used for Ghana and how are capacities of local experts being built for MRV?</p>	<p>Activity data of specific statistics through sampling often has an error factor with it. Provisions of UNFCCC and FCPF give room for some errors based on the requirements of the organization you are submitting to. Data sampling and maps gives room to report on uncertainty of emissions reduction specific uncertainty for each deforestation strata.</p> <p>For stratification of the forest, it is important that the strata needs to be identifiable/verifiable using remote sensing/ satellite imagery. Strata could include; accessibility, openness of forest, vegetation area, terrain. Team of experts from Winrock and Applied Geo-Solutions to train specific institutions/individuals who will be involved in the MRV. Knowledge sharing on delineation of cocoa from forests</p>

			<p>Is Ghana reporting on Tier 1, 2 or 3 data for the reference level taking into consideration Forest Preservation Program?</p> <p>Any difference between Tier 2 and Tier 3?</p>	<p>FPP is under Tier 2 because we have country specific data on above-ground biomass, below-ground biomass, litter and deadwood. However, soil data is not very easy to fall under Tier 2 because it should look at change in stock rather the available stock Ghana has. In this case Ghana can use Tier 1 for soil.</p> <p>Tier 3 allows negotiating at different levels using models as informative tool rather than just activity data. Indonesia and Kenya are the REDD+ countries using Tier 3 supported by Australia. Canada has Tier 3 and supporting Mexico.</p> <p>A country can still use national datasets to achieve Tier 3 but will use these repetitive data to as well as remote sensing for modelling. However this setup is very costly and is a decision of the country to see if it's imperative to use Tier 3</p>
<p><i>Private Sector Stakeholder Consultation Workshop on the Ghana Cocoa Forest REDD+ Emission Reduction Program – Draft Implementation Plan, at Accra City, 6th June, 2016.</i></p>	<p>Ministry of Finance, MLNR, FC, COCOBOD, Solidaridad, Touton, Koapa Kokoo Ltd, Cargill Ghana Ltd, Unicom Com. Ghana Ltd, Cocoa Processing Co. Ltd, Barry Callebant Com. Ltd, First Sky Commodities, Olam Ghana, Kuman Koma Company, BD Associates, Armajaro</p>	<p>Ghana Cocoa Forest REDD+ Emission Reduction Program – Draft Implementation Plan, by <i>John J. Mason, Nature Conservation Research Centre, Accra.</i></p>	<p>We always talk about over 2million, CHED is also talking about 1.7million. Which one should we reference?</p>	<p>In order to achieve the objective the ERP will be implemented wall to wall, thus across the entire landscape. But, of course activities will not be implemented at the same scale across the entire landscape at the same time. There is the need to start from priority areas and later scale up to cover the entire landscape.</p>
			<p>There is high deforestation identified particularly along the middle vertical stretch of the program area, and this could be attributed to 'galamsey'. Why were these areas left out in the selection of the HIAs?</p>	<p>The issue of mining and illegal mining has become a national security issue. The ERP resources could not be used to solve national security problem. It is therefore advisable to start with areas that do not have much gold deposit and therefore free from issues associated with mining.</p>

	<p>Ghana, Nyonkopa Cocoa Buying Ltd, Produce Buying Company Ltd, Cocoa Merchants Ghana Ltd, Mondelez International Cocoa Life, Federation Commodities.</p>		<p>Is there significant location those undertaking surface mining will move to when the resource get exhausted at their current deposit sites.</p> <p>Concerning the premium price of the commodity – who pays the difference in the price</p> <p>Who will be responsible for paying the differential premium</p> <p>The role of the traditional authorities, district assemblies. The byelaw made at local levels are more adhere to than the national laws. If the traditional authorities and local people understand the importance of the program.</p>	<p>We will have to hear from some other state agencies on what government is doing to resolve the problems and also ensure that such activities are not moved into other areas within the landscape.</p> <p>It is the consumer who will be responsible for paying the differential premium. This is because the principle is to internalize the externality. There has to be a Ghana cocoa It is not a premium but a different commodity</p> <p>At the HIA levels there will be landscape and land use planning will be undertaken and at that level all these stakeholders will be brought together to discuss issues amicably and find solution to addressing them. Reference to the HIA Consortium min the implementation plan</p>
<p><i>Multi Stakeholder Workshop on Ghana Cocoa Forest REDD+ Emission Reduction Program – Draft Implementation</i></p>		<p>Ghana Cocoa Forest REDD+ Emission Reduction Program – Draft Implementation Plan, by Dr. Rebecca Ashley Asare, Nature Conservation Research Centre, Accra</p>	<p>We always talk about further assessment and analysis of data What happened to the FPP data – is not useful?</p>	<p>The FPP data were used by the consultant in this assignment. However, there were some constrains. For instance, FPP data used only up to 2010. There is therefore the need for some additional analysis in order to fill some gaps in available data.</p>

<p>Plan. 14th June 2016 at the Auditorium of the Forestry Commission</p>		<p>There are lots of other things going on in the landscape apart from cocoa as well as very important stakeholders like traditional authority and farmers. How are they being consulted and involved?</p>	<p>HIA is the cocoa farmer – initial the stakeholder analysis under this assignment focused on who has the money to invest in the program to achieve the desired result. Going forward with implementation, there will further stakeholder mapping and analysis in each HIAs. The HIAs are going to have their own consortium and will have to work on all other things including which stakeholders should be involved in the implementation of the program to be involved. For instance, apart from political commitment at the highest level, we are also looking at political commitment at the local level where the traditional authorities are in charge.</p>
		<p>Will international world accept our proposal that we are not tackling mining which is a key driver of DD</p>	<p>For the mining area, there is little the program can do at this stage. What we focus on at this stage is the inter-institutional collaboration with those that are in charge of regulating mining activities in the country. The issue of mining has become a national security concern and will therefore be tackled from another direction with other stakeholders leading the process. Going forward there is the need to adopt the CREMA concept.</p>
		<p>Since HIA were determined based on cocoa sector stakeholders, is it not possible to miss other important non-cocoa sector stakeholders who are also working in the landscape and whose activities could impact the program positively or negatively?</p>	<p>The cocoa sector is a 2billion dollar investment sector. The question therefore is how we leverage on the cocoa sector investment in the landscape to achieve the emission reduction.</p>
		<p>With the decision to go with the administrative district – do we envisage some challenges that may arise during the implementation</p>	<p>There may be some challenges, but the good thing that this is a landscape program and the use of administrative district suitable means of defining the landscape because COCOBOD and Forestry district are different. The fact is even COCOBOD has two sets of districts.</p>

			Public and private funding in the program area. Mobilizing public finance for initiative like this has always been very challenging. What is the potential source of funding for the program?	The potential source of funding will be the private sector and that will be cocoa money. Private cocoa companies have their sustainability programs and these programs are not helping our forest.
			How best will HIAs be integrated into the District Assembly system so that it will benefit from the district in term of district planning	The HIA is a landscape and the consortium that will include all stakeholders (public private NGO CSO etc.) and with this it can then be integrated into the District assembly development plan. The program has to be sustainable and cocoa alone cannot make it sustainable and this is why the role of other stakeholders including the district assembly will be very important in ensuring the sustainability of the program.
Consultation with Key Policy Makers held on 7th July, 2016.	to be added	to be added	to be added	to be added
<i>Consultation with the parliamentary select committee on Lands and Forestry on Ghana's ER Program held on 21st July, 2016 at Villa Victoria</i>	Hon. Henry Kwabena Kokofu; Hon. Benito Owusu-Bio; Hon. Seidu Amadu (Alhaji); Hon. Alijata Sulemana Gbentie (Hajia); Hon. Kwame Anyimadu-Antwi Mr. Yaw Kwakye Hilma Manan Charles Sarpong Kwame Agyei Raymond Kofi Sakyi Sena Tabiccah	Presentation on "GCFRP" by Mr. Yaw Kwakye, Head of the Climate Change Unit; and "Ghana's REDD+ Strategy" by Mr. Kwame Agyei, MRV Specialist	Is the 2015 land cover map to show current state of our forest cover?	Analytical work is underway to have 2015. The result of the assignment will include the 2015 maps.

			Was it a policy directive that Pamu Berekum forest reserve should be cleared? What is FC doing to address the problem? Are there sensitization in the area to educate the people on the effects of forest lost?	FC has been implementing diverse programs including high forest biodiversity, FIP and NREG-TA are undertaking restoration activities within depleted forest reserve etc. Steps taking to recover forest loss at the Pamu Berekum forest reserve includes sustainable forest plantation programme and education and sensitization of the public on the adverse effects of climate change.
			To what extent is the programme attracting private sector investment?	The GCFRP is designed in such a way to leverage on the support from the private sector in Implementing the programme.
			who ensures that the lands are reclaimed after mining?)	Mining has highlighted in the REDD+ Strategy document, but FC and its stakeholders cannot solve the issue of mining alone. It needs a strong political commitment and cooperation between stakeholders in the mining sector.
			The participants indicated that the petroleum industries rely on arbitration and mediation to resolve disputes and i.e. Environmental issues could be resolved through the ADR act after amendment, they indicated that the legal section of parliament has already and continue to discuss this issues.	
<i>Consultation with Metropolitan, Municipal and District Assemblies (MMDA's) on Ghana's ER Program held in Takoradi on</i>	Districts and municipal El and district assemblies: Elembelle; Sefwi Wiawso; Juaboso; Aowin Suama; Juaboso; Wasa Amenfi East; Ellembelle; Assin North;	"Ghana's REDD+ Strategy" by Mr. Kwame Agyei, MRV Specialist; "Overview of Ghana's ER Program" Mr. Yaw Kwakye, Head, CCU of FC; "The importance of the programme to cocoa sector"	Who gives charcoal burners permit to produce charcoal? Charcoal production has been identified as a major contributor to forest degradation. What is the REDD+/ERP doing about this? Also, the Sustainable	The Energy Commission has a unit designated to ensure that charcoal production is regulated. Unfortunately, they do not have enough offices and staff strength especially at the transition zone where charcoal production is on the rise. The FC encourages communities to establish wood lots by planting fast growing species for harvesting and leave natural forests to develop.

<p>16th and in Kumasi on 18th August 2016.</p>	<p>Twifo-Atti Morkwa; Upper Dankyira East; Denkyembour; Asutifi; Adansi South; Ahafo Ano North; Adansi South; Birim Central; Asunafo South and North; Amansie West;</p>	<p>Mr. Kissiedu Kwapong, Deputy Director of Research, Monitoring and Evaluation of COCOBOD</p>	<p>Development Goal (SDG) 17 talks about partnerships for achieving these goals. What is currently being done?</p>	
			<p>Why is the ERP focusing on agriculture, specifically cocoa? Why is the Volta region not included in the GCFRP as cocoa is also grown there?</p>	<p>There is a special reason why cocoa is the focus. The ERP is targeting the cocoa forest mosaic landscape within the High Forest Zone of Ghana as the initial step. Agricultural expansion (conversion of forest to cocoa) is a major driver of carbon emission within that landscape. There are other ERP being designed for the Savanna, Coastal and Togo Plateau (which will cover the Volta Region).</p>
			<p>How does the programme address tenant farmers seeking clarity from land owners?</p>	<p>The ERP engages with chiefs to keep them abreast with the programme and equipped to support reforms of land tenure systems in Ghana.</p>
			<p>How can the ERP contribute to law enforcement as Ghana has a lot of laws but enforcing the laws has always been a major problem?</p>	<p>Law enforcement has been a problem for all institutions. There are problems with personnel especially as most forest guards are over-aged or not motivated to perform their mandate to the fullest. We need collective effort in this regard to enable Ghana realize the goal of the ERP and REDD+.</p>
			<p>How will sensitization of the program be done in the communities?</p>	<p>The REDD+ program has a Communication Strategy with clear approaches for engaging various stakeholders including local communities and the private sector. HIA will be established with governance body MoFA, traditional authorities and district assemblies. The capacity of the governance body will be built to support the sensitization and awareness creation on the ERP.</p>

			How can the program provide community members with alternative livelihood schemes other than forest products?	Alternative livelihood is a very important initiative; there is a need to effectively implement and monitor it. Most MMDA's present reiterated the fact that the program must focus on providing alternative livelihood schemes for natives to concentrate on other income generating avenues rather than on forests to avoid further degradation.
Consultation with Traditional Authorities on Ghana's ER Program Held in Kumasi on 23 rd August 2016.	participants included paramount chiefs from the following traditional authorities: Akyem Abuakwa; Juaso; Wassa Mpohor; Wassa Amenfi; Ajumako; Kukuom; Goaso; Mampong; Agona; Yamfo; Begoro; Akyem Bosome; Ayem Tafo; Assin Owirenkyi; Asebu; Mankessim; Dunkwa	"Ghana's REDD+ Strategy" by Mr. Kwame Agyei, MRV Specialist; "Overview of Ghana's ER Program" Mr. Yaw Kwakye, Head, CCU of FC; "The importance of the programme to cocoa sector" Mr. Kissiedu Kwapong, Deputy Director of Research, Monitoring and Evaluation of COCOBOD	How will REDD+ contribute to Legislation?	Issue of legislation is a major driver and a high priority activity. Law enforcement has been a major problem in Ghana for several years. Over the years chiefs have been able to enforce local laws in their communities and impose sanctions which have worked effectively. Capacity building programmes have been organized for frontline staff of the FC in all 10 regions. The training is a continuous process. Through REDD+ and support from traditional authorities and other stakeholders the FC is poised to effectively engage in emission reduction programmes.
			How can traditional authorities contribute to sensitization?	Chiefs could use the opportunity during festivals or durbars when engaging with communities to sensitize communities. Also the NRS is willing to attend program or durbars upon invitation from chiefs to talk about the program. The GCFRP is committed to supporting traditional authorities in terms of sensitization and high level advocacy on the program.
			What has COCOBOD done in reducing emissions and contributing to the ERP?	COCOBOD has engaged with farmers in capacity building programmes by using community extension agents. Staff of COCOBOD have also been trained on the ERP and REDD+ and staff of FC and COCOBOD work together to help reduce emissions.

Annex 6: Safeguards measures

Key environmental/ social and governance in ER Program	Cancun Safeguards	Relevant World Bank Safeguard Policies and Procedures	Remarks
Policies, Laws and Regulations	(a) That actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements	OP 4.01 on EA takes into account the country's overall policy framework, national legislation, and institutional capabilities related to the environment and social aspects; and obligations of the country, pertaining to project activities, under relevant international environmental treaties and agreements. OP4.36 requires projectsto abide by international environmental agreements and forest certification systems to adhere to all relevant laws.	<p>The GCFRP is consistent with both the Cancun safeguards and OP 4.01. The SESA and the REDD+ strategy documents confirm consistency with the World Bank Safeguards policy.</p> <p>The ER Programme is pushing for the passage of the National Forest and Wildlife Bill consistent with the new Forest and Wildlife Policy-2012.</p>
Transparency and national forest governance structures	(b) Transparent and effective national forest governance structures, taking into account national legislation and sovereignty	<p>World Bank OP4.36 requires forest certification systems to implement transparent decision-making procedures. The Bank also has a Policy on Access to Information.</p> <p>(Relevant sections in World Bank Safeguard Policies include:</p> <p>Access to Information policy, in particular para. 1</p> <p>OP 4.01 on Environmental Assessment, in particular paras. 3 and 13</p> <p>OP 4.36 on Forests, in particular para. 14</p> <p>BP 4.04 on Natural Habitats, in particular para. 5</p> <p>BP 4.12 on Involuntary Resettlement, in particular para. 2).</p>	The ER Program will adopt the World Bank Safeguard policy on Access to Information in the absence of a national law. The 1992 Constitution of Ghana guarantees a fundamental Right to Information under Article 21. However the regulation (the Bill) is yet to be passed by the parliament.
Rights of local	(c) Respect for the knowledge and rights	OP4.10 refers to the right of indigenous communities to free, prior, and informed consultation, though it does	There are no indigenous people in the country and therefore OP 4.10 is not triggered. However, the ER

<p>communities/ indigenous people and Free, Prior and Informed Consent (FPIC)</p> <p>Vulnerable groups</p>	<p>of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, including the adopted UN Declaration on the Rights of Indigenous Peoples</p>	<p>not refer to consent. (Relevant sections include: OP 4.10 on Indigenous Peoples, in particular para. 1; para. 16; paras. 19 to 21 OP 4.36 on Forests, in particular paras. 10 and 14 BP 4.36 on Forests, in particular para. 4) OP4.10 requires consultations and benefit allocation to be performed in a gender inclusive manner. OP4.20 states that the World Bank will occasionally assess the gender dimensions of development in member</p>	<p>Program makes provision for consultations with local communities to ensure support and buy-in from these stakeholders.</p> <p>The RPF prepared for the ER Program/REDD+ activities makes provision for vulnerable groups.</p>
<p>Stakeholder Participation</p>	<p>(d) The full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities, in the actions referred to in paragraphs 70 and 72 of this decision;</p>	<p>OP4.10. The policy states consultations must be performed in indigenous language at a culturally appropriate venue with adequate time for stakeholders to build consensus, in instance where indigenous and local people are affected. (Relevant sections include: OP 4.01 on Environmental Assessment, in particular paras. 14 and 15 OP 4.10 on Indigenous Peoples, in particular para. 1 OP 4.04 on Natural Habitats, in particular para. 10 OP 4.12 on Involuntary Resettlement, in particular para. 7 OP 4.36 on Forests, in particular paras. 11 and 12)</p>	<p>Multi-stakeholder consultations and participation approach was adopted in the design of the REDD+ document including the strategy and the implementation plan. Stakeholder consultation platforms were established for REDD+ and ERP for that matter, which cut across representatives from public, private CSO groups, traditional authorities, local communities, cocoa farmers, women and disabled/physically challenged persons.</p>
<p>Biodiversity and other ecosystem services</p>	<p>(e) Actions are consistent with the conservation of natural forests and biological diversity, ensuring that actions referred to in paragraph 70 of this decision are not used for the conversion of</p>	<p>OP4.01 on Environmental Assessment (paras 2-3 and Annex A, paras 7 and 9), OP 4.04 on Natural Habitats (paras 1,4,5, and 9 and Annex A, para 1) and OP4.36 on Forests (paras 1, 5 and 7) address the preservation of areas with high biodiversity value and promote the protection of environmental services.</p> <p>OP4.01 on Environmental Assessment is used to identify, avoid, and mitigate potential negative environmental</p>	<p>An opportunity and risk matrix for the intervention were carried out and included the SESA report (See Section 6). The ER Program/REDD+ activities and the FIP developed ESMF which identified potential adverse impacts and provide for mitigation measures. Article 19 in the VPA developed Joint Monitoring and Review Mechanism (consisting of EU and Ghanaian officials) to assess the environmental, social and economic impacts of the Agreement and how they will</p>

Mitigate adverse environmental impacts	natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits ⁴	impacts. This policy is considered the umbrella policy on environmental safeguards. OP4.0 4 on Natural Habitats and OP4.36 on Forests also outline mitigation of negative impacts including forest displacement, conversion, and degradation. It states the World Bank will not support projects that result in the significant degradation or conversion of critical natural habitats.	be addressed consistent with World Bank OP 4.01
Address risk of reversals and displacement of emissions	(f) Actions to address the risks of reversals	The Operating Procedures do not explicitly outline reversals; however this could be covered in the OP 4.01 on Environmental Assessment, in particular paras. 1 and 2 OP 4.36 on Forests, in particular para. 14	Inherent reversal risks include illegal mining, potential cocoa price volatility/climate change on cocoa production, and forest fires. Risk Management and Finance in the implementation plan embraces the development of a climate risk insurance facility for farmers (i.e. consistent with paragraph 28a of Decision 1/CP. 16 Cancun Agreement). The Ghana Cocoa Board, a major stakeholder in the ER Program, regulates the price of cocoa in Ghana, which therefore moderates potential future price volatility.
	(g) Actions to reduce displacement of emissions	The Operating Procedures do not explicitly outline displacement; however this could be covered in the OP 4.01 on Environmental Assessment, in particular para. 2; para. 3 OP 4.04 on Natural Habitats, in particular para. 4 and Annex A, para. 1(c)	There are potential for displacement (leakage) from the implementation plan developed. The program is providing permanent climate-smart agriculture options. The VPA/FLEGT initiative seeks to address the issue of illegal logging in the program area in particular. The limits for harvesting timber from plantation forests in the program area will be incorporated into the national allowable cut (under the GFPDP) to minimise the incidence of unsustainable harvesting in the program ER Program area.
Safeguards Information System (SIS)–	(UNFCCC Decision 12/CP.17)	OP4.12, OP4.20, OP4.10, OP4.04, OP4.01, and OP4.36 all contain references to the development of monitoring and/ or reporting systems depending on the context and	The development of SIS and operationalization of a comprehensive approach to safeguards (including a SIS) for Ghana REDD+, when adopted and integrated into

Monitoring and Reporting		scope of the project being implemented.	the national policies and laws will be applied in ERP implementation.
Land tenure, tree tenure and benefit sharing	-	OP4.10 requires that legal recognition be obtained for projects being implemented on lands belonging to Indigenous Peoples. Op4 .12 requires involuntarily resettled persons to be provided with “adequate” land tenure	Major areas to support reforms for program implementation include tree tenure reforms, clarification of carbon transaction rights and benefit-sharing agreements and reform of cocoa farm input system. Under the NREG TA, the MLNR developed (draft) for tree tenure and benefit sharing. The framework is expected to contribute to Ghana’s drive at halting deforestation, enhancing its forest estate and promoting good forest governance.
Resettlement related and Livelihood issues	-	OP4.12 requires that involuntary settlement is avoided or minimized, and where unfeasible, assistance is given to displaced persons to improve or restore their livelihoods.	A Process Framework (PF) has been prepared in line with World Bank requirements. A RPF has been developed to guide implementation of any resettlement related issues that may arise. The GFPS under its strategic objective 3, aimed to create employment opportunities and sustainable livelihoods in rural communities through forest plantation development. Over 2million jobs are to be created over the 25-year period with about 500,000 as full time jobs.
Grievance Mechanism	-	OP4.12 outline conflict resolution procedures to be followed in resolving potential conflicts arising from displaced persons.	A Grievance Redress Mechanism has been prepared for the ER Program/ REDD+ for implementation. Further details are provided in the next section, 14.3.

Annex 7: Methodologies for Estimating Emissions and Removals

Deforestation

Emission Factors

In accordance with the stock-difference⁹⁰ method, C emissions were estimated as the difference in carbon stocks before deforestation and the carbon stocks following deforestation, including carbon in living and dead biomass⁹¹ and carbon released from the soil. The emission factor is calculated as follows:

$$EF_{def(t,x,y)} = (C_{bio.pre(x)} - C_{bio.post(t,y)} + \Delta SOC_{(t)}) * 44/12$$

Where:

- $EF_{def(t,x,y)}$ = Emission factor for year t for deforestation for stratum x and driver y, tCO₂e ha⁻¹
- $C_{bio.pre(x)}$ = Carbon stock in biomass in stratum x, prior to deforestation, t C ha⁻¹
- $C_{bio.post(t,y)}$ = Carbon stock in biomass in year t post-deforestation, for driver y, t C ha⁻¹
- $\Delta SOC_{(t)}$ = Change in soil carbon stocks in year t following deforestation, t C ha⁻¹
- 44/12 = Conversion factor from carbon to CO₂

Pre-deforestation carbon stocks for the GCFRP ACCOUNTING AREA include all carbon pools (aboveground carbon, belowground carbon, deadwood, litter, non-tree vegetation, and soil). Estimates of the magnitude of carbon stocks in these pools were mostly derived from the results of a forest biomass mapping and inventory project undertaken through the Mapping of Forest Cover and Carbon Stock in Ghana project (conducted under the Forest Preservation Programme (FPP), through support from the Government of Japan).

The only carbon pool for which FPP data were not used for pre-deforestation carbon stocks was the deadwood carbon pool, as stocks appeared to be significantly over estimated⁹². Instead, IPCC defaults were applied for this pool (aboveground carbon stocks multiplied by 0.06)

The Wet Evergreen, Open Forest stratum did not have data on belowground carbon stocks, so the Mokany (2006) root-to-shoot ratio of 0.2 was applied to the aboveground carbon stocks to derive an estimate.

Pre-deforestation carbon stocks were calculated as follows:

$$C_{bio.pre(x)} = (C_{agb(x)} + C_{bgb(x)} + C_{dw(x)} + C_{lit(x)} + C_{veg(x)})$$

Where:

- $C_{bio.pre(x)}$ = Carbon stock in biomass in stratum x, prior to deforestation, t C ha⁻¹
- $C_{agb(x)}$ = Carbon stock in aboveground live tree biomass in stratum x, t C ha⁻¹

⁹⁰ 2006 AFOLU Guidelines, Chapter 2 Generic Methodologies Applicable to Multiple Land-Use Categories, http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_02_Ch2_Generic.pdf

⁹¹For Ghana's reference level for deforestation emissions, carbon stored in harvested wood products was not included

⁹²This was explained in the FPP Report on Mapping of Forest Cover and Carbon Stock in Ghana (2013) pp.128: "Deadwood in large quantities was discovered in moist evergreen plots, most likely due to trees felled on the cocoa farms admitted to expand into the forest reserves and palm pruning residues of palm trees in off-reserve areas." Nevertheless, when plot deadwood carbon pool estimates were extrapolated to per-hectare values were unrealistically high (e.g., Moist Evergreen Closed Forest 2914 t CO₂/ha and Moist Semi-deciduous NW Closed forest 399 t CO₂/ha - over double the aboveground tree biomass).

- $C_{bgb(x)}$ = Carbon stock in belowground live tree biomass in stratum x , t C ha⁻¹
 $C_{dw(x)}$ = Carbon stock in deadwood pools in stratum x , t C ha⁻¹ (includes both standing and lying deadwood)
 $C_{lit(x)}$ = Carbon stock in litter in stratum x , t C ha⁻¹
 $C_{veg(x)}$ = Carbon stock in non-tree vegetation in stratum x , t C ha⁻¹ (includes shrubs, sapling, and herbaceous understory)

Applied Pre-Deforestation Carbon Stocks:

Confidence interval (95% of the mean +/- %) noted in parenthesis.

		AGB (tC/ha)	BGB (tC/ha)	Dead Wood Carbon Stocks (tC/ha)	Litter Carbon Stocks (tC/ha)	Non-tree Carbon Stocks (tC/ha)	Total C stocks (not soil) t C/ha
Wet Evergreen	Closed Forest	124.1 (0.7)	7.9 (108.0)	7.4 (184.0)	2.7 (32.0)	0.0 (N/A)	142.2
	Open Forest	30.3 (2.3)	6.1 (N/A)	1.8 (N/A)	0.0 (N/A)	0.0 (N/A)	38.1
Moist Evergreen	Closed Forest	139.4 (0.2)	23.5 (28.0)	8.4 (69.0)	2.7 (33.0)	0.5 (40.0)	174.5
	Open Forest	39.8 (0.8)	3.0 (48.0)	2.4 (4.0)	1.1 (192.0)	1.6 (773.0)	47.9
Moist Semideciduous SE	Closed Forest	123.5 (0.6)	23.2 (23.2)	7.4 (93.0)	0.0 (46.0)	1.1 (63.0)	155.2
	Open Forest	35.2 (1.4)	7.6 (171.0)	2.1 (190.0)	3.5 (55.0)	0.3 (250.0)	48.7
Moist Semideciduous NW	Closed Forest	40.4 (0.2)	15.3 (12.0)	2.4 (74.0)	2.2 (23.0)	1.1 (23.0)	61.3
	Open Forest	17.5 (0.3)	9.0 (31.0)	1.0 (165.0)	2.2 (50.0)	0.8 (50.0)	30.5
Upland Evergreen	Closed Forest	73.1 (0.4)	23.5 (99.0)	4.4 (176.0)	1.4 (36.0)	0.3 (279.0)	102.6
	Open Forest	26.2 (0.8)	12.8 (47.0)	1.6 (113.0)	1.1 (67.0)	0.8 (173.0)	42.5

Post-deforestation carbon stocks correspond to the land uses comprised of IPCC land use classes (forest land, cropland, grassland, wetlands, settlement, bare land, other land), and their carbon stocks were derived from a combination of sources including:

- 1) Cropland: Given the complex set of post-deforestation land uses found in Ghana, particularly due to the wide range of agricultural land uses, the 'cropland' post-deforestation land use was subdivided into:
 - a) Cropland: The FPP project collected data on cropland carbon stocks for each strata, reflecting all cropland (currently cropped or in fallow), rice fields, and agro-forestry systems. Estimates included above and belowground carbon stocks (other carbon pools in cropland are not considered significant), and post-deforestation carbon stocks were calculated as follows:

$$C_{bio.post(y,t)} = (C_{agb(y)} + C_{bgb(y,t)})$$

Where:

$C_{bio.post(y,t)}$ = Carbon stock in biomass in land use y at time t , post-deforestation, t C ha⁻¹

$C_{agb(y)}$ = Carbon stock in aboveground live tree biomass in land use y , t C ha⁻¹

$C_{bgb(y,t)}$ = Carbon stock in belowground live tree biomass in land use y at time t ⁹³, t C ha⁻¹

⁹³ If roots remain following deforestation, pre-deforestation belowground carbon stocks are assumed to decompose over 10 years. Therefore post-deforestation below-ground carbon stocks are estimated as $C_{bgb(x,t-1)} - (C_{bgb(x)}/10)$, where t equals years following deforestation.

- b) Plantations: Carbon stocks in plantations were treated as a time-weighted average of stocks in the cycle, and were sourced from Kongsager et al. (2013)⁹⁴'s study of carbon stock accumulation potential of tree plantations in Ghana. The values for plantation carbon stocks represent time-averaged carbon stocks for a 30-year rotation, based on the results of that study, as cited in a presentation by the same author. The study only estimates aboveground carbon stocks, so belowground carbon stocks were derived by applying Mokany (2006) root-to-shoot ratio of 0.2 for tropical moist semi-deciduous forest with aboveground biomass stocks <125 t d.m. ha.
- 2) Grassland: FPP data were applied where available per strata, otherwise the IPCC default of 3.1 t C/ha was applied.
 - 3) Wetlands: Assumed to be zero
 - 4) Settlement: FPP data were applied where available per strata, otherwise post-deforestation carbon stocks were assumed to be zero.
 - 5) Bareland/other: Assumed to be zero

Applied Post-Deforestation Carbon Stocks:

Stratum		Average Carbon stocks (tC/ha)		Source	
Wet Evergreen	Cropland	Cropland (herbaceous and slash and burn)		30	FPP data
		Plantations	Oil Palm	36	Kongsager et al. 2013
			Citrus	55	Kongsager et al. 2013
			Rubber	90	Kongsager et al. 2013
			Cocoa	55	Kongsager et al. 2013
	Grassland		3.1	IPCC Grasslands Table 3.4.2 value for tropical moist & wet	
	Wetlands		0		
	settlement		0		
Bareland/other		0			
Moist Evergreen	Cropland	Cropland (herbaceous and slash and burn)		39	FPP data
		Plantations	Oil Palm	36	Kongsager et al. 2013
			Citrus	55	Kongsager et al. 2013
			Rubber	90	Kongsager et al. 2013
			Cocoa	55	Kongsager et al. 2013
	Grassland		3.1	IPCC Grasslands Table 3.4.2 value for tropical moist & wet	
	Wetlands		0		
	settlement		0		
Bareland/other		0			
Moist Semideciduous SE	Cropland	Cropland (herbaceous and slash and burn)		51	FPP data
		Plantations	Oil Palm	36	Kongsager et al. 2013
			Citrus	55	Kongsager et al. 2013
			Rubber	90	Kongsager et al. 2013
			Cocoa	55	Kongsager et al. 2013

⁹⁴ Kongsager et al. The carbon sequestration potential of tree crop plantations. Mitigation Adaptation Strategies for Global Change (2013) 18:1197–1213. Time-averaged results from http://orbit.dtu.dk/files/55883745/Carbon_Sequestration.pdf

	Grassland		3.1	IPCC Grasslands Table 3.4.2 value for tropical moist & wet	
	Wetlands		0		
	settlement		0.00		
	Bareland/other		0		
Moist Semideciduous NW	Cropland	Cropland (herbaceous and slash and burn)	31		
		Plantations	Oil Palm	36	Kongsager et al. 2013
			Citrus	55	Kongsager et al. 2013
			Rubber	90	Kongsager et al. 2013
			Cocoa	55	Kongsager et al. 2013
	Grassland		4.70	FPP data	
	Wetlands		0		
	settlement		6.34	FPP data	
	Bareland/other		0		
Upland evergreen	Cropland	Cropland (herbaceous and slash and burn)	34		
		Plantations	Oil Palm	36	Kongsager et al. 2013
			Citrus	55	Kongsager et al. 2013
			Rubber	90	Kongsager et al. 2013
			Cocoa	55	Kongsager et al. 2013
	Grassland		3.1	IPCC Grasslands Table 3.4.2 value for tropical moist & wet	
	Wetlands		0		
	settlement		0		
	Bareland/other		0		

Changes in soil carbon stocks are related to the post deforestation land use and were estimated using the IPCC 2006 guidelines whereby changes in soil carbon stocks are based on the use of soil factors that account for how the soil is tilled, the method of management, and inputs in the post deforestation land use. This method is described through the following equation:

$$\Delta SOC = C_{soil} - (C_{soil} * F_{LU} * F_{MG} * F_i)$$

Where:

ΔSOC = Soil carbon emitted, t C ha⁻¹

C_{soil} = Carbon stock in soil organic matter pool (to 30 cm); t C ha⁻¹

F_{LU} = Stock change factor for land-use systems for a particular land-use, dimensionless (IPCC AFOLU GL)

F_{MG} = Stock change factor for management regime, dimensionless (IPCC AFOLU GL)

F_i = Stock change factor for input of organic matter, dimensionless (IPCC AFOLU GL)

The change in soil carbon stocks is assumed to occur over a 20 year time period, but for simplicity in accounting emissions are considered to be committed and to occur at the time of conversion.

The following factors and assumptions were made for each strata:

- CROPLAND: Applied Table 5.10 in 2006 IPCC Guidelines FLU value for shifting cultivation, shortened fallow based on FAO Country Paper on Ghana, "Shifting cultivation (also known as "slash and burn") is the main

farming practice in Ghana, ... land is left to fallow for some time (3 - 5 years, depending on the availability of land for farming."⁹⁵

- FLU: Long-term cultivated Tropical moist = 0.48
- FMG: reduced tropical moist/wet = 1.15
- FI: Medium, dry and moist/wet = 1.0
- PLANTATIONS: Plantations assigned following factors:
 - FLU: Long-term perennial tree crops = 1.0
 - FMG: No till, tropical, moist/wet = 1.22
 - FI: Medium, dry and moist/wet = 1.0
- GRASSLAND: IPCC Table 6.2, FMG: Moderately degraded grassland
- WETLANDS: As seen from activity data, the areas converted to wetlands over the reference period were along the coast, so it was assumed this was due to flooding. As such, zero emissions were assumed.
- SETTLEMENT: From IPCC Chapter 8, "for the proportion of the settlement area that is paved over, assume product of FLU, FMG and FI is 0.8 times the corresponding product for the previous land use (i.e., 20% of the soil carbon relative to the previous land use will be lost as a result of disturbance, removal or relocation);"
- BARELAND/OTHER: "Other Land" includes bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five land-use categories. Assumed to be land devoid of vegetation and likely to be at some point in a cropping cycle. Therefore, the same values for cropland were applied.
 - FLU: Long-term cultivated Tropical moist = 0.48
 - FMG: reduced tropical moist/wet = 1.15
 - FI: Medium, dry and moist/wet = 1.0

Activity Data

Activity data for deforestation consisted of four land cover maps for the years 2000, 2010, 2012, and 2015. All maps used Landsat 7 images, with the 2010 map using ALOS images in addition to Landsat images. Originally, a map for 2013 was planned, but due to poor Landsat images for this year, a map of 2012 was used instead. For the 2010 map, efforts were made to harmonize it with the 2000 map to ensure comparability and change calculation. The 2000 and 2010 maps were produced during the FPP project, while the later maps were produced in 2016 by the RMSC of the Ghana Forestry Commission.

Due to the similarity in the spectral signature of agricultural tree crops, especially cocoa, rubber, oil palm and citrus, the land cover maps were not able to distinguish these non-forest plantations from natural forestlands. For this reason, a high-resolution remote sensing methodology was applied (as described in Annex 8), to determine the proportion of the mapped forest that is actually agricultural tree plantations. This analysis was able to distinguish areas of forestland, cocoa, plantation (which included rubber, oil palm, and citrus), and other non-plantation and non-forest land cover types. The results showed that of the areas mapped as deforestation in the land cover maps, between 1-4% were actually transition of cocoa to non-plantation non-forest types, and between 12-39% were actually transition of plantation to non-plantation non-forest types, depending on the ecozone (Figure 21). Emissions from deforestation were subsequently reduced by the percentage of mapped deforestation that was determined to actually be movement of agricultural tree plantations to non-plantation non-forest land cover types.

⁹⁵M. O. Abebrese, 2002. ROPICAL SECONDARY FOREST MANAGEMENT IN AFRICA: Reality and perspectives, Ghana Country Paper. Available at: <http://www.fao.org/docrep/006/j0628e/j0628e53.htm>

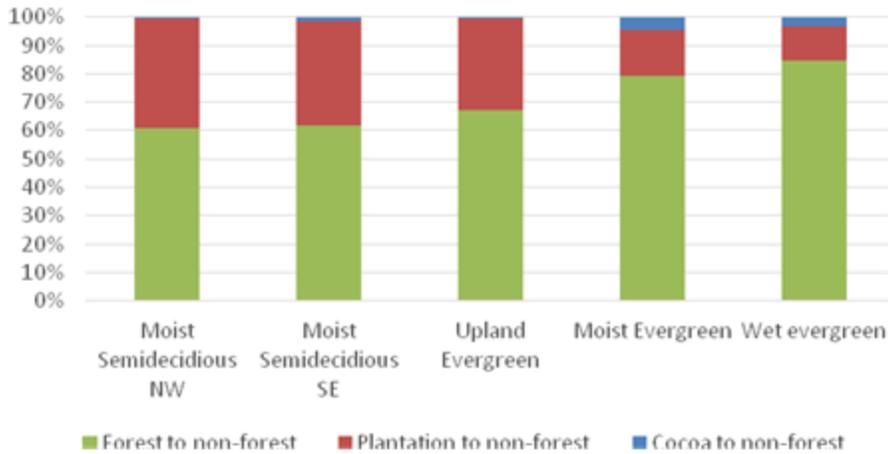


Figure 21: Results of high resolution analysis, showing percentage of areas classified as deforestation that were actually transition of agricultural tree plantations to non-plantation non-forest land cover types.

The high resolution analysis was also applied to determine the percentage of area classified as forest remaining forest in the land cover maps that was actually forest transitioning to agricultural tree plantations (and thus qualifying as deforestation). Results showed that of all the classes that the land cover maps classified as forest remaining forest, forest to cocoa made up between 12-18% and forest to plantation made up between 2-5% (Figure 22). Emissions from deforestation were subsequently increased by the percentage of mapped forest remaining forest that was determined to actually be deforestation resulting from movement of forest to agricultural tree plantations.

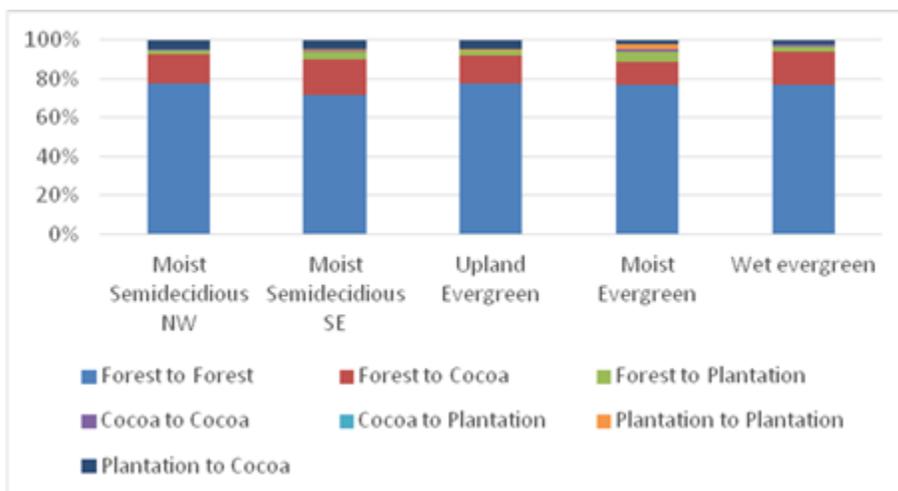


Figure 22: Results of high-resolution analysis, showing percentage of areas classified as forest remaining forest that were actually transition of forestland to agricultural tree plantations.

Enhancement

Removal Factors

Teak:

The study conducted by Adu-Bredu S., et al. 2008⁹⁶ assessing tree carbon stocks in teak stands in moist evergreen forest in Ghana was used to develop removal factors for teak stands in the GCFRP ACCOUNTING AREA. The value of 97.69 Mg C ha⁻¹ included both above and belowground tree carbon stocks. The long-term average carbon stock of the teak stands over multiple cycles was assumed to be half the total carbon value (49 Mg C ha⁻¹).

The final removal factor in t CO₂/ha was calculated by applying the molecular weight ratio of carbon dioxide to carbon, of 44/12 to get 179 t CO₂/ha.

Non-teak broadleaf species:

Due to a lack of data available on carbon stocks in tree plantations in Ghana, IPCC AFOLU Vol. 4 default values from table 4.8 reflecting aboveground biomass in forest plantations were applied. Values for 'Africa broadleaf >20 years' for three ecological zones in the GCFRP Accounting Area (tropical rain forest, tropical moist deciduous forest, and tropical dry forest) were averaged to get 173.3 t d.m. ha⁻¹, which was converted to t C/ha by applying a factor of 0.5 to get 86.7 t C/ha. The belowground biomass value was then generated by applying a root-to-shoot ratio of 0.235 for tropical/subtropical moist forest/plantations >125 Mg ha⁻¹ (Mokany et al.2006), to get 20.36 t C/ha. The total aboveground biomass in non-teak broadleaf species was thus estimated to be the sum of below and above-ground biomass stocks: 107.01 t C/ha.

The long-term average carbon stock of the non-teak broadleaf species stands over multiple cycles was assumed to be half the total carbon value (53.5 Mg C ha⁻¹).

The final removal factor in t CO₂/ha was calculated by applying the molecular weight ratio of carbon dioxide to carbon, of 44/12 to get 196.19 t CO₂/ha.

The values and sources used to estimate for both removal factors are summarized below:

Species		Value	Unit	Source
Teak	AGB & BGB	98	Mg C ha	Adu-Bredu S., et al. 2008
	Long-term stocks	49	Mg C ha	Adu-Bredu S., et al. 2008
	Final RF	180	t CO ₂ /ha	
Non-teak broadleaf	AGB	173	t d.m. ha ⁻¹	IPCC AFOLU Vol. 4 table 4.8 above-ground biomass in forest plantations.
		87	Mg C ha	
	BGB	20	Mg C ha	Mokany et al.2006
		107		
	Long-term stocks	54		
	Final RF	196	t CO ₂ /ha	

Activity Data

The NFPDP was launched in September 2001, and records reflect planting only began in 2002. As such, there were zero activity data for 2001. No activity data were available for the years 2014 and 2015, and thus the average rate of on-reserve planting from 2010-2013 was applied, due to the fact that many of the plantation programs (MTS, CFMP, GPDP, and Model) ceased in 2009. As such, it was more appropriate to use an average planting reflecting for the type of plantation programs that were undertaken starting in 2010. For MTS, CFMP, GPDP, and Model programs, the total area planted in the GCFRP ACCOUNTING AREA forest reserves up to 2009 was divided across the years the program was in operation. The calculated activity data, as well as the applied failure rates and dates of NFPDP programs are summarized below.

⁹⁶Adu-Bredu S., et al. (2008). Carbon Stock under Four Land-Use Systems in Three Varied Ecological Zones in Ghana. Proceedings of the Open Science Conference on Africa and Carbon Cycle: the CarboAfrica project, Accra, Ghana, 25-27 November 2008. Available at <http://www.fao.org/3/a-l2240.pdf>

Adjusted Annual Area Planted Totals (hectares planted per year)															
Program	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GPDP	0	0.00	0.00	1236	1236	1236	1236	1236	1236	0	0	0	0		
MTS	0	2726	2726	2726	2726	2726	2726	2726	2726	0	0	0	0		
CFMP	0	0	0	0.00	806	806	806	805.57	806	0	0	0	0		
Model	0	0	0	3	3	3	3	3	3	0	0	0	0		
Total	0	2726	2726	3965	4771	4771	4771	4771	4771	649	1908	2115	1050		
With failure rate applied	0	1502	1502	2185	2629	2629	2629	2629	2629	490	1439	1595	1050	1143	1143

Failure rate 2001-2009: 44.9% (Source: SURVEY AND MAPPING OF GOVERNMENT PLANTATION SITES ESTABLISHED BETWEEN 2004 TO 2009 IN SOME FOREST RESERVES OF GHANA)

Failure rate 2010-2015: 24.57 % (Source: NFPDP dataset '2013 Final Verification Nationwide'. Calculated based on the average survival rate recorded.) As actual estimates for rates of survival per forest reserve were available in this dataset for the year 2013, those rates were applied to activity data for 2013.

NFPDP Programs	Dates of Operation	Years
GPDP	2004-2009	6
MTS	2002-2009	8
CFMP	2005-2009	5
Model	2004-2009	6
Other (Private Developers & Expanded Program)	2001-2015	6

Legal Timber Harvesting

The calculations of total emissions from logging are a result of a multiplication of total emission factor (TEF) (in t CO₂.m⁻³) by the activity data (m³ extracted) for each year.

Activity Data

Ghana has timber extracted data for the entire historical period 2010-2015. These data present the total volumes of timber extracted annually by species and by administrative unit (region and locality) based on the Tree Information Forms (TIFs). With the exception of 2000 and 2015, this data is summed annually across administrative units to calculate total volumes by areas of interest, including the GCFRP Accounting Area (GCFRP ACCOUNTING AREA). Only half of the volumes extracted for 2000 and 2015 were used, so that the reference period does not exceed 15 years in total, so not to exceed the upper reference period upper limits under the Carbon Fund Methodology requirements.

Emission Factors

The three components of the logging emission factor were calculated using the methods in Pearson et al. (2014) and using field measurements taken by the Ghana Forestry Commission following the standard operating procedures in Annex D. This method accounts separately for three emission sources that occur as a result of logging:

1. emissions from the subsequent milling, processing, use and disposal of the felled timber-tree,
2. emissions from incidental damage caused by the timber-tree fall and cutting of the log in the forest, and
3. emissions from infrastructure associated with removing the timber out of the forest (e.g. skid trails, logging decks and logging roads).

All emissions sources are associated with the volume of timber extracted (e.g. m³) to allow for simple application of timber harvesting statistics. As such, the total emission factor from selective logging is estimated as the sum of three factors:

$$\text{TEF} = \text{ELE} + \text{LDF} + \text{LIF}$$

Where:

TEF Total emission factor (tCO₂.m⁻³)

ELE Emissions from extracted log (tCO₂.m⁻³)

LDF Logging damage factor (tCO₂.m⁻³)

LIF Logging infrastructure factor (t CO₂.m⁻³)

A committed emissions approach is employed in the calculations to simplify the carbon accounting process. This means that all emissions are accounted in the year of the logging event.

To estimate ELE, an average wood density (in g cm⁻³) weighted by the volume extracted of each species from the activity data is calculated, so that the average wood density (and therefore ELE) would reflect the species most harvested in Ghana. The applied wood density of 0.39 t/m³ was calculated as the weighted mean of harvested species from the database of legally harvested trees between 2000 and 2015. The chainsaw milling efficiency applied is 50% as identified by the Forestry Commission and through literature review (Hansen et al, 2012). The ELE reflects the proportion of carbon dioxide still sequestered in harvested wood products 100 years after initial harvest (considered to be permanently sequestered). A half-life of 30 years and a decay rate of 0.023 are applied as given in Table 12.2 in IPCC 2006⁹⁷.

Estimate for LDF are based on the measurements taken from the field work conducted by Ghana FC in May 2016, using the SOPs in annex D.

For skid trails it was assumed that creation of trails would avoid trees with a diameter greater than 20cm at breast height. The proportion of forest biomass represented by trees less than 20cm was calculated from the dataset of Napier and Kongsager (2011).⁹⁸ Across ten plots these trees represented 12% of the forest biomass (95% CI = 4.8%). This proportion was applied to the carbon stock derived from the FPP inventory dataset.

From measurement of 164 skid trails by the Ghana Forestry Commission in May 2016, the mean width was 4.6m (95% CI = 0.64m). For five skid trails the associated extraction volume was determined, and through integration with trail length a skid trail emission factor was derived.

For logging roads, the mean width was calculated from 11 roads measured by the Ghana Forestry Commission in May 2016 (5.3m +/- 0.65; mean +/- 95% CI). A per length of road emission was calculated from this width and the carbon stock from the FPP inventory dataset. However, no volumes could be paired with emission per length of road. This correlation instead had to rely on the study of Medjibe et al (2013) from Gabon.⁹⁹ Medjibe et al determined road construction of 1 m per cubic meter of log extracted.

For logging decks volume correlations were similarly unavailable. The Medjibe et al study determined logging decks represent 1.6 square meters of area per cubic meter of log extracted. This paired with FPP inventory data produced a decks emission factor.

Illegal Timber Harvest

The calculations of total emissions from illegal logging will mirror those used for legal logging with the multiplication of total emission factor (TEF) (in tCO₂ m⁻³) by the activity data (m³ extracted).

Activity Data

Yearly activity data on the amount of timber harvested illegally in Ghana are not available. However, a number of studies have been conducted that provide estimates on the amount of illegal timber harvest. We will use the estimates from one of these studies - 'Revisiting Illegal Logging and the Size of the Domestic Timber Market (Hansen et al. 2012).¹⁰⁰ Hansen estimated illegal logged timber at 4.1 million m³ per year.

⁹⁷ IPCC (2006) Guidelines for national greenhouse gas inventories. Volume 4: Agriculture, Forestry, and Other Land Use. <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

⁹⁸ Napier, J. and Kongsager R. (2011). The breakeven price of REDD-credits: a case study from Kade, Ghana. Master Thesis, Technical University of Denmark.

⁹⁹ Medjibe, V.P., Putz, F.E., Romero, C. (2013) Certified and uncertified logging concessions compared in Gabon: Changes in stand structure, tree species, and biomass. Environmental Management. DOI 10.1007/s00267-012-0006-4

¹⁰⁰ Hansen, C.P., L. Damnyag, B.D. Obiri and K. Carlsen 2012. Revisiting illegal logging and the size of the domestic timber market: the case of Ghana International Forestry Review Vol.14(1), 2012 39

Emission Factor

The emission factor for illegal timber harvest follow the same methodology as for legal timber harvest. The measurements taken in the field in May 2016 by the Forestry Commission were used to estimate TEF for illegal as well as legal timber harvest. As for legal logging a committed emissions approach is taken.

The extracted log emissions (ELE) were calculated with the following assumptions:

- The species harvested reflect the same species distribution as species legally harvested in Ghana;
- The logs are chainsaw milled in the forest;
- The resulting products are solidwood products.

Based on the findings of Hansen et al. (2012) the chainsaw milling efficiency applied is 27%. The applied wood density of 0.39 t/m³ was calculated as the weighted mean of harvested species from the database of legally harvested trees between 2000 and 2015. The ELE reflects the proportion of carbon dioxide still sequestered in harvested wood products 100 years after initial harvest (considered to be permanently sequestered). A half-life of 30 years and a decay rate of 0.023 are applied as given in Table 12.2 in IPCC 2006¹⁰¹.

Based on an understanding of illegal timber practices by the Forestry Commission, LDF is assumed to be identical to the factor used for legal timber harvesting.

LIF is assumed to be nullified as illegal timber harvested either use infrastructure created by legal timber harvesting practices.

Degradation from Fire

Total emissions from forest fire calculated using Equation 2.27 from IPCC (2006)¹⁰²:

$$L_{fire} = A * M_B * C_f * G_{ef} * 10^{-3}$$

Where:

L_{fire} = amount of greenhouse gas emissions from fire, tonnes of each GHG

A = area burnt, ha

M_B = mass of fuel available for combustion tonnes ha⁻¹

C_f = combustion factor, dimensionless

G_{ef} = emission factor, g kg⁻¹ dry matter burnt

Activity Data

The activity data represents the total area burnt during the reference period. The MODIS Burned Area Product was used, which gives monthly totals of burned area at the 500m scale across the globe. The following steps were taken to process this data for the reference period:

- Clip the global dataset to the GCFRP ACCOUNTING AREA.
- Combine the monthly burned area pixels to create yearly burned area maps, from 2001-2015 (2000 was not included to maintain a 15-year reference level).
- Divide burned area between areas of forest remaining forest between 2000 - 2015 and areas of deforestation, both according to Ghana's national land cover maps. Burned area on all other land cover types was discarded. This was done to differentiate between forest fires that result in degradation and fires that result in deforestation, since deforestation fires will be accounted for separately.

¹⁰¹ IPCC (2006) Guidelines for national greenhouse gas inventories. Volume 4: Agriculture, Forestry, and Other Land Use. <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

¹⁰² IPCC (2006) Guidelines for national greenhouse gas inventories. Volume 4: Agriculture, Forestry, and Other Land Use. <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>

The high-resolution analysis (described in Annex 8) was used to determine the percentage of fires, mapped as deforestation fires, were actually fires occurring on agricultural tree plantations transitioning to non-plantation non-forest lands. A proportion of deforestation fires were removed from deforestation accounting corresponding to this percentage. The high-resolution analysis was also used to determine the proportion of fires, mapped as degradation fires, were actually on areas of: 1) agricultural tree plantations remaining plantations (and thus neither degradation nor deforestation fires), and 2) forest transitioning to agricultural tree plantations (and thus being deforestation fires). A proportion of deforestation fires were removed for degradation accounting corresponding to the percentages of these areas (and a proportion was added to the deforestation accounting).

Emission Factors

There are three parameters that make up the emission factor: the biomass available for combustion (M_B), the combustion factor (C_f), and the emission factor (G_{ef}).

Biomass available for combustion

The biomass available for combustion refers to all the biomass in the forest that is subject to burning by fire. Generally, only part of the overall biomass in the forest is subject to burning. The carbon pools that are subject to burning depend on the fire regime in the area; if surface fires are common, generally only the pools close to the forest floor are included (litter, deadwood, shrubs, grasses, small trees, and topsoil organic carbon). If canopy fires are common, a greater proportion of the larger trees may be available for combustion as well.

For this reference level, it was assumed that all forest biomass was subject to burning. This assumption was made due to the nature of the activity data from the MODIS burned area product. The burned area product generally detects only larger fires, given that it is a satellite product viewing primarily the forest canopy, has a spatial resolution of 500m. Therefore, fires must kill relatively large sections of the canopy in order to be detected by MODIS, and it is assumed that if the canopy is being burned, the understory biomass is also subject to burning.

For areas that burned in multiple years, a reduced biomass available for burning value was used, which was equal to the original biomass multiplied by the combustion factor and by the number times the area had burned. For example, if an area burned for the second time in specific year, the original biomass was multiplied by the combustion factor and by 2.

Combustion factors

Combustion factors refer to the fraction of M_B that is actually combusted during fire. C_f depends largely on climate and ecosystem, since combustion will be more complete under dry, hot conditions. Defaults from IPCC¹⁰³ were used since country-level data was not available.

Emission Factors

Emission factors in Equation 2.27 refer to the amount of each GHG that is emitted when a certain amount of dry matter is burned. The reference level accounts for the major GHGs emitted during biomass burning, which are CO_2 , N_2O , and CH_4 . Since these emission factors are fairly constant across forest types, IPCC (2006) defaults from Table 2.5 were used for G_{ef} .

¹⁰³ Factors from Table 2.6 of IPCC (2006)

Annex 8: Spatial Analysis to Identify Tree Crops in the GCFRP Accounting Area

Methods

Mapping detailed land cover classes such as unshaded cocoa and monoculture plantations requires higher quality imagery (i.e. imagery with limited atmospheric variability) because the differences between the spectral signature of the classes can be subtle. We acquired Landsat data from the USGS (<http://earthexplorer.usgs.gov/>), with a focus on scenes with limited clouds and atmospheric contamination (i.e. haze). Our focus here was on the southern central portion of Ghana, tiles 194055 and 194056. Given our criteria for the highest quality imagery, we selected images from the dates 7 May 2002 (2002127) and 21 December 2015 (2015355).

The Landsat imagery from the USGS are provided as digital numbers (DN). We converted these simplified measurements of radiance to surface reflectance using our open source Geospatial Image Processing System (GIPS). This system is freely available at <http://gipit.github.io/gips/>. Within this system, atmospheric correction is performed with the 6S model (Vermote et al. 1997). Clouds and thick haze are masked with a modified version of the ACCA algorithm (Irish et al. 2006). Additionally, the image acquired in 2015 has missing data due to the Scanline Corrector Failure on Landsat 7 (Williams et al. 2006). No sufficiently cloud-free data was available in 1999, 2000, or 2001 for either Landsat 5 or 7 nor in 2015/16 from Landsat 8.

Via the GIPS software, we generated several vegetation indices. Vegetation indices are intended to isolate attributes of the land surface and minimize residual atmospheric and sun-sensor geometry effects. Here, we used the indices listed in Table 1. These indices were stacked the two tiles (194055 and 194056) were merged into a single raster. This raster was used as input into our classification system.

Table 1. Landsat and PALSAR indices

NDVI	$(\text{NIR} - \text{Red}) / (\text{NIR} + \text{Red})$
LSWI	$(\text{NIR} - \text{SWIR1}) / (\text{NIR} + \text{SWIR1})$
SATVI	$(\text{SWIR1} - \text{Red} / (\text{SWIR1} + \text{Red} + \text{L})) * (1+\text{L}) - (\text{SWIR2}/2)$
NDTI	$(\text{SWIR 1} - \text{SWIR 2}) / (\text{SWIR 1} + \text{SWIR 2})$
Brightness	$0.3561(\text{Blue}) + 0.3972(\text{Green}) + 0.3904(\text{Red}) + 0.6966(\text{NIR}) + 0.2286(\text{SWIR 1}) + 0.1596(\text{SWIR2})$
Greenness	$-0.3344(\text{Blue}) + -0.3544(\text{Green}) + -0.4556(\text{Red}) + 0.6966(\text{NIR}) + -0.0242(\text{SWIR 1}) + -0.2630(\text{SWIR2})$
Wetness	$0.2626(\text{Blue}) + 0.2141(\text{Green}) + 0.0926(\text{Red}) + 0.0656(\text{NIR}) + -0.7629(\text{SWIR 1}) + -0.5388(\text{SWIR2})$
MSI	$\text{SWIR 1} / \text{NIR}$
RFDI	$(\text{HH} - \text{HV}) / (\text{HH} + \text{HV})$

For the generation of the 2015 maps, we used SAR backscatter from PALSAR2, available as mosaics from the Japanese Space Agency (JAXA; http://www.eorc.jaxa.jp/ALOS/en/palsar_fnf/data/index.htm), in addition to the Landsat. We converted the digital numbers provided in the mosaics to sigma nought backscatter. In addition to the HH and HV polarizations, we generated two indices HH/HV^2 and RFDI $((\text{HH} - \text{HV}) / (\text{HH} + \text{HV}))$. These observations are originally provided at the ~25 m spatial resolution. We re-projected the data to match the Landsat 30 m grid.

The classification approach applied here is supervised, meaning training or calibration data are require. We collected calibration data from two primary sources. The team collected 75 observations, primarily of cocoa, in April 2016. These observations included digitized field boundaries of the observed areas. Additionally, we digitized polygons for cocoa, oil palm plantations, natural forest, citrus plantations, rubber plantations, settlement, water, grassland, and crop land (Figure 1). These observations we

created using high resolution imagery from 2015, as well as 1997-2003. In total, we used 554 polygons for calibration and validation of the 2015 maps and 268 polygons for the 2002 maps.

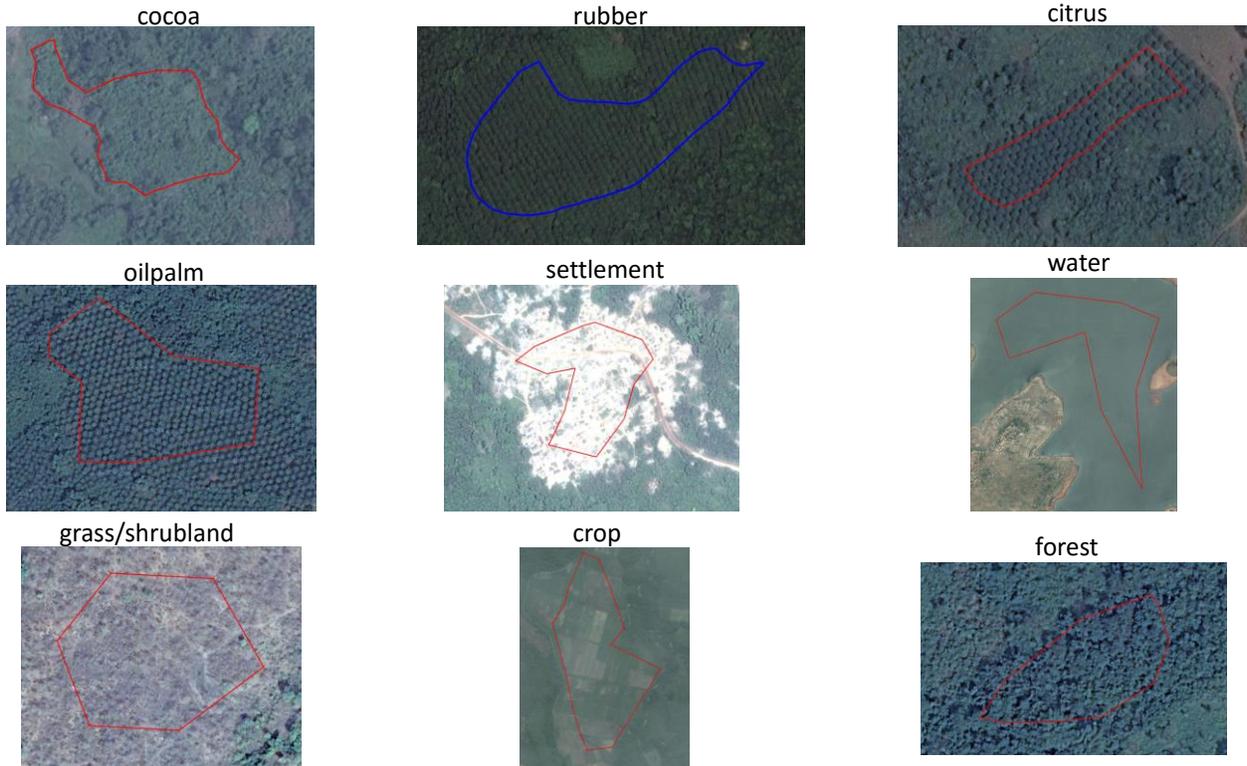


Figure 23: Example of calibration and validation polygons digitized using Google Earth Pro

For supervised classification, we used our **General Automated Remote Sensing Classification Tool (GARSeCT)** to create maps. GARSeCT is a Random Forest classifier (SciKits-Learn python module) wrapped in python code to make remote sensing classification easier to perform. A Random Forest classifier falls under the general category of “Machine Learning” methods. It is an “Ensemble Learning” algorithm, meaning that several models are combined to solve a single prediction problem. In this case, each component model application is a Classification Decision Trees. A Decision Tree asks a series of binary questions which maximize the information we get about the response variable (class). It performs a “greedy search”, asking which one binary question will maximize the info about Y (the class)? Each root node produces two daughter nodes. At each daughter node, we repeat recursively. The advantages of using a decision tree classifier include ease of use, sensitivity to linear and non-linear relationships, provides information on feature importance, and generally avoids overfitting.

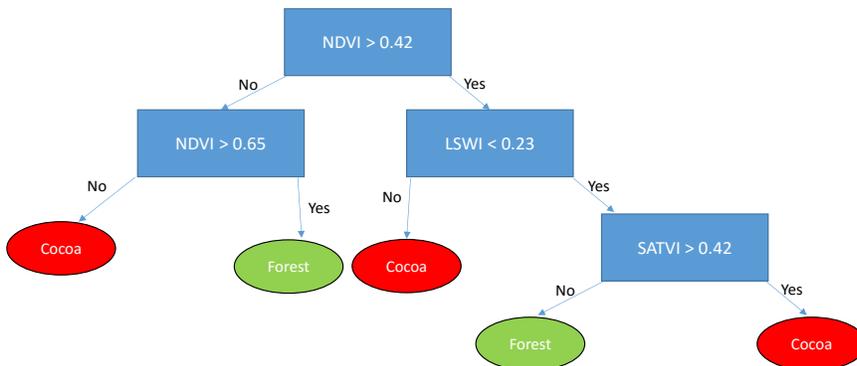


Figure 24: Example classification tree (for illustration only)

The stacks of processed raster data and digitized training data are provided as input to GARSeCT. We performed separate classifications for 2002 and 2015. GARSeCT returns a classified map, cross-validation results, and maps of likelihood of class membership. We ran GARSeCT using 100 trees. Each tree relies on a different subset of data for training, and therefore, can produce different classifications for each pixel, thereby “casting a vote” for class membership for each pixel. These “votes” are tallied and captured in the likelihood of class membership maps and the class with the most votes for each pixel is reported in the classification map.

Results

Consistently, we found that tasseled cap (TC) wetness, SATVI, TC-brightness, and NDVI provided the most predictive power. In the 2015 classification, the four metrics derived from PALSAR provided the least predictive power. Our results showed significant confusion between some classes, particularly the plantation classes. Specifically, oil palm (59%) and rubber (60%) showed low reliability or user’s accuracy. We post-processed the classification maps to simplify the classifications to four classes: *cocoa*, *plantation* (from oil palm, rubber, and citrus), *forest*, and *other* (from settlement, water, grass, and crops). For 2015, out of sample user’s accuracy was 74% for cocoa, 89% for plantation, 88% for forest, and 99% for other. For 2002, out of sample accuracy was lower: 68% for cocoa, 78% for plantation, 88% for forest, and 85% for other. The plantation area breakout was approximately 60% oil palm, 30% rubber, and 10% citrus

We visually inspected the resultant maps. There was some concern that our approach was over predicting cocoa and plantation at the expense of forest. We adjusted our classification maps using the class likelihood maps. We set a forest threshold of 10% in 2002 and 20% in 2015, meaning any pixel with a forest class likelihood over this threshold is classified as forest. Additionally, we performed some manual clean-up by digitizing areas of known error and correcting the classification.

The final maps have lower validation accuracy (e.g. 69% and 65% reliability for cocoa and plantation) but, we believe, more accurately reflect the land cover.

Discussion and next steps

The maps created here do not have a minimum unit size below the pixel resolution. It may be appropriate to eliminate plantations under a certain size and classify these as forest.

Texture metrics, including standard deviation and spatial co-occurrence, were generated from a 90 x 90 meter moving window. These texture metrics as generated here, failed to improve the classification performance, most likely because the spatial scales of the features on the landscape (e.g. tree crops, roads) are often smaller than the 90 m scale offered by this texture analysis. We propose as an improvement, the use of the 15 meter panchromatic band for measuring texture.

Via JAXA, we acquired quad pole fine beam PALSAR backscatter data at 10 m spatial resolution for a subset of southern Ghana. The additional spatial resolution and polarity are likely to produce more accurate classification results. We propose to further explore the improvements provided by the inclusion of radar data. While this won’t help with reference levels, radar data is likely to play a large role in forest monitoring in the tropics in the years to come due to a proliferation of sensors and an insensitivity to cloud cover.

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Annex 9: Logging Measurement Standard Operating Procedure to Update Logging Emission Factors

Standard Operating Procedures for Estimation of Carbon Stock Damage from Selective Logging in Ghana

Timothy RH Pearson, Felipe M Casarim, Sarah Walker,
Alexandre Grais, Gabriel Sidman and Sandra Brown

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Contents



Introduction and How to Use this Document

The active and important role vegetation and soil play in the global carbon cycle and global climate change is now internationally recognized. Vegetation and soil can act as both a net source and a net sink of greenhouse gas (GHG), depending on how the land is managed. Alterations in land use management techniques that result in changes to net GHG emissions are now a significant component to the regulatory and voluntary actions taking place globally to combat climate change.

The purpose of this document is to provide standard field measurement approaches to assist in quantifying the amount of carbon stored within the various organic pools found within a landscape. The methods presented in each Standard Operating Procedure (SOP) have been developed over time by foresters and ecologists to accurately and efficiently estimate carbon stocks.

The SOPs are grouped by purpose. The first set of SOPs are general and can be used for many field measurement goals. A set of SOPs are also presented on the measurement of all the carbon pools. These can be used to estimate the standing stock of a carbon pool within a stratum. Another set of SOPs are presented to estimate the emissions resulting from selective logging. Various SOPs are also presented on estimating canopy cover. These SOPs should only be used when the purpose of data collection is known. This manual *does not* specify guidance on stratification, sampling design, sampling intensity, the spatial distribution of sampling points, pool measurement selection, or the methods needed to transform field measurement data into carbon stock estimates. Therefore, additional guidance is required prior to any field data collection.

The SOPs present a *generic* approach that will be appropriate for most land cover types, ecosystems, and locations. However, all the field measurement methods presented in this document may require adaptation for the specific ecosystem, land cover, and vegetation type in the location where sampling will take place.

The SOP manual is also *not specific* to any regulatory or voluntary market standard such as the Clean Development Mechanism (CDM), Climate Action Reserve (CAR), American Carbon Registry (ACR), Verified Carbon Standard (VCS), CarbonFix, or PlanVivo.

Therefore, it is imperative that methods presented here are adapted into a specific SOP manual, developed for a specific field measurement campaign. The particular adaptations required should be conducted by a forester or ecologist with detailed knowledge in field carbon stock measurement and in the particular carbon market regulatory requirements.

In addition, the SOPs should not be conducted without receiving extensive field training in the measurement methods performed by a qualified forester or ecologist.

It is expected that this manual will be updated overtime as the carbon market changes and as terrestrial carbon science evolves. Therefore, it is recommended that prior to use, users visit Winrock International's website to determine if a more recent version is available at www.winrock.org/ecosystems

SOP Field safety

No matter what activities are engaged in or where they are carried out, *safety is the first priority* and all precautions must be well thought out in advance and then strictly adhered to. Planned field activities

must remain flexible and allow for adjustments in response to on-the-ground assessments of hazards and safety conditions. Accordingly, field personnel must be vigilant and always avoid unnecessary risks. Field crew members in particular must be well prepared. It is recommended that personnel engaging in field activities hold general first aid training and if possible training in CPR.

The following guidelines will apply to all field-based activities:

- Mandatory buddy system. Field crews will include no less than two people who must be directly accompanying each other for the entire duration of field work. Ideally field crews should include a minimum of three people; in case of an accident resulting in injury one person may leave to seek help while another person stays with the injured crew member.
- For each day in the field, specific location and scheduling information must be logged in advance with a point person who can be reached at any time during the anticipated duration of field work. While in the field, crews should check in with their designated point person once per day.
- Each independent crew must carry a radio, satellite phone or cell phone provided by the institution. Crews should make sure to check batteries each time before entering the field.
- Trip planning will include identification of the nearest medical facility and specific directions to reach that facility. When in areas with poisonous snakes, advance communication should be made to verify that appropriate antivenins are available. Where applicable, hunting regulations should be checked with local state agencies prior to field work.
- Personnel will carry personal and institutional insurance cards with them at all times. As well, personnel will carry identification and, if possible, institutional business cards at all times.
- Field crews will carry a first aid kit with them at all times. First aid kits should contain Epinephrin/Adrenalin or an antihistamine for allergic reactions (e.g. bee/wasp stings). Sun block and insect repellent should be carried in the field.
- Where poisonous snakes are common, snake chaps are recommended. In the event of snake bite, the victim should be taken immediately to a medical facility. Conventional “snake bite kits” (e.g. suction cups, razors) have been proven ineffective or even harmful and should not be used.
- Basic field clothing should be appropriate for the range of field conditions likely to be encountered. This will include: sturdy boots with good ankle support or rubber boots, long sleeves and pants, rain gear, and gloves. Blaze orange (vest or hat) is recommended when and where hunting may be taking place. Where necessary, to avoid extended contact with plant oils, ticks, and/or chiggers, a change of clothes should be made at the end of each day in the field and field clothes should not be reworn without first laundering.
- Ensure personnel stay sufficiently hydrated and carry enough clean water for the intended activity. Carry iodine tablets or other water purification tablets in case there is a need to use water from an unpurified source.
- Heightened caution should be given while operating any motor vehicle, particularly on backcountry roads where conditions are unreliable and rights-of-way are often not designated or adhered to. ATVs should always be operated at low speeds (<15 mph).
- Some plots may be too hazardous to sample. Situations include: plot center on a slope too steep to safely collect data (i.e., >100% slope or on a cliff); presence of bees; volcanic activity; illegal activities; etc. When hazardous situations arise, a discussion should be conducted among the team members to assess the situation.

SOP Quality Assurance/Quality Control

Those responsible for aspects of data collection and analysis should be fully trained in all aspects of the field data collection and data analyses. Standard operating procedures should be followed rigidly to

ensure accurate measurement and re-measurement. It is highly recommended that a verification document be produced and filed with the field measurement and calculation documents that show that QA/QC steps have been followed.

Quality Assurance

Data collection in field:

During all data collection in the field, the crew member responsible for recording must repeat all measurements called by the crew member conducting the measurement. This is to ensure the measurement call was acknowledged and that proper number is recorded on the data sheet. In addition, all data sheets should include a 'Data recorded by' field with the name of the crew member responsible for recording data. If any confusion exists, the transcribers will know which crew member to contact. After data is collected at each plot and before the crew leaves the plot, the crew leader shall double check to make sure that all data are correctly and completely filled. The crew leader must ensure the data recorded matches with field conditions, for instance, by verifying the number of trees recorded.

Data sheet checks:

At the end of each day all data sheets must be checked by team leaders to ensure that all the relevant information was collected. If for some reason there is some information that seems odd or is missing, mistakes can be corrected the following day. Once this is verified and potential mistakes checked, corrected data sheets shall be handed over to the person responsible for their safe keeping while the crew is still in the field. Data sheets shall be stored in a dry and safe place while in the field. After data sheets have been validated by crew leaders, the data entry process can commence.

Field data collection Hot Checks:

After the training of field crews has been completed, observations of each field crew and each crew member should be made. A lead coordinator shall observe each field crew member during data collection of a field plot to verify measurement processes and correct any errors in techniques. It is recommended that the crew chiefs switch to a different crew to ensure data collection procedures are consistent across all field crews. Any errors or misunderstandings should be explained and corrected. These types of checks should be repeated throughout the field measurement campaign to make sure incorrect measurement techniques have not started to take place.

Data Entry checks:

To ensure that data is entered correctly, the person entering data (whether during fieldwork or after a return to the office) will recheck all of the data entered and compare it with the original hard copy data sheet before entering another sheet. It is advised that field crew leaders either enter the data, or participate in the data entry process. Crew leaders have a good understanding of the field sites visited, and can provide insightful assistance regarding potential unusual situations identified in data sheets. Communication between all personnel involved in measuring and analyzing data should be used to resolve any apparent anomalies before final analysis of the monitoring data can be completed. If there are any problems with the plot data (that cannot be resolved), the plot should not be used in the analysis.

Quality Control

Field measurement error estimation

A second type of field check is used to quantify the amount of error due to field measurement techniques. To implement this type of check, a complete re-measurement of a number of plots by people other than the original field crews is performed. This auditing crew should be experienced in forest measurement and highly attentive to detail. One gap per concession should be randomly or systematically chosen to be re-measured. Field crews taking measurements should not be aware of which gaps will be re-measured whenever possible.

After re-measurement, data analysis is conducted and biomass estimates are compared with estimates from the original data. Any errors discovered could be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error.

For all the verified plots:

$$\text{Measurement Error (\%)} = \left| \frac{(\text{t C/ha of measured plot} - \text{t C/ha of re-measured plot})}{\text{t C/ha of re-measured plot}} \times 100 \right|$$

This error level will be included in the carbon stock reporting.

Data Entry quality control check:

After all data has been entered into computer file(s), a random check shall be conducted. Sheets shall be selected randomly for re-checks and compared with data entered. Ten percent of all data sheets shall be checked for consistency and accuracy in data entry. Other techniques such as data sorting and verification of resulting estimates shall be employed to ensure data entered properly corresponds to field sites visited. Personnel experienced in data entry and analysis will be able to identify errors especially oddly large or small numbers. Errors can be reduced if the entered data is reviewed using expert judgment and, if necessary, through comparison with independent data.

Framework for estimation of carbon stock damage from selective logging

Selective logging is the harvesting of a proportion of the trees in a stand or forest. Selective logging may be used to manage even or uneven-aged stands with the goal of protecting forest soils, maintaining or improving wildlife habitat, increasing site productivity, or improving tree species diversity. There will be auxiliary damage to the forest carbon stock during selective logging; from broken branches on remaining trees to the creation of new roads and the clearing of areas for logging decks. The calculation of forest carbon stock damage from selective logging involves the use of several SOPs.

Estimation of carbon stock damage from selective logging involves the following SOPs:

- 1 LOCATING FELLED TREES
- 2 CARBON STOCK DAMAGE DUE TO TREE FELLING
- 3 AREA OF CANOPY OPENING
- 4 CROWN AREA FROM THE GROUND
- 5 CARBON STOCK DAMAGE DUE TO LOGGING EXTRACTION

Locating felled trees

Field Equipment:

GPS receiver

Locating felled trees in a dense forest is not always an easy job. It is best to have a person familiar with the logging process in the area to act as a guide. If a guide is not available it is best to start at a logging deck and systematically walk all skid trails radiating out from the logging deck. One systematic method is to use the clockwise method, start with a skid trail at the north or nearest to the northern direction from the center of the logging deck. Next proceed with the next closest skid trail in a clockwise direction. Look for signs of felled trees such as stumps, broken or bent branches in the standing trees, or canopy openings.

Carbon stock damage due to tree felling

Field Equipment:

Flagging
GPS receiver
DBH tapes
DME or other distance measuring equipment
Machete or knife
Permanent marking pen
Compass
Large diameter calipers

Laboratory Equipment:

Drying oven
Laboratory scale

This SOP describes the methodology for estimating the biomass remaining in the forest that has been selectively logged. The concept underlying these methods is based on the “Gain-Loss” method described by the IPCC (2006). Measurements in the “Logging Plots” should be conducted soon after the tree is felled (within approximately 3 months).

Estimating carbon emissions due to selective logging practices consists of an investigative activity, where field technicians must take accurate measurements. Amongst the measurements taken in the field, **DBH**

and **dimensions of the removed log** are especially **important**. These measurements must be accurate and reflect the real conditions in the field. It is not always possible to measure DBH because part of the bole where one would measure it (see 'Measuring Trees') is removed. Thus, when DBH measurement is not possible, other measurements must be used to extrapolate to DBH.

Measurements on felled tree:

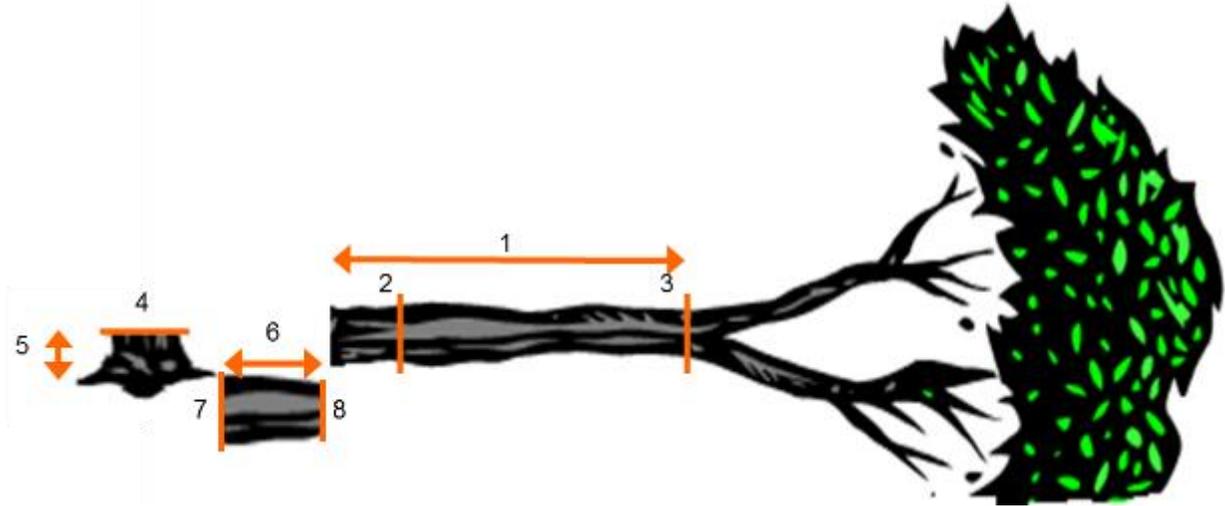
1. Locate stump and crown of logged tree. Be sure to verify that the crown is from the selected stump by determining the angle of the tree fall, species and distance from stump. Search the surrounding area for other potential stumps.
2. Measurements on the stump of the tree (should be taken with calipers):
 - a. Measure the height of the remaining stump (H_{Stump}).
 - i. If stump is taller than 1.3m and not buttressed, measure DBH.
 - b. Measure the diameter (d) at the top of the stump (d_s). This measurement is very important as measurement of DBH is often not possible.
 - i. If the tree is not buttressed, measure the diameter as in a tree (wrapping the tape around the stump).
 - ii. If the tree is buttressed, measure the height of the buttress (H_{Buttress}) and the diameter at the top of the buttress, which can be either top of the stump or top of a piece that was cut from bottom of the log. Measure diameter of buttressed tree using a watch and taking three measurements total: 12-to 6, 2 to 8, 4 to 10, where 12 o'clock always points due north when diameter measurement is horizontal, or upward to the sky when diameter is vertical (i.e. piece lying on the ground). The average of these three measurements will be the diameter of the stump (d_s)
3. If a section(s) of the bole of the tree is cut and left in the forest (i.e. will not be removed), measure the length (l_{Piece}) and the diameters at the bottom ($d_{\text{Piece-B}}$) and top of the piece ($d_{\text{Piece-T}}$). If piece is buttressed, measure diameter using a watch and taking three measurements total: 12-to 6, 2 to 8, 4 to 10, where 12 o'clock always points due north when diameter measurement is horizontal, or upward to the sky when diameter is vertical (i.e. piece lying on the ground).
4. Measure the diameter at the top cut where the log was removed (d_T). If diameter of top of the tree is irregular, measure diameter using a watch and taking three measurements total: 12-to 6, 2 to 8, 4 to 10, where 12 o'clock always points upward to the sky.
5. Measure the length of the log (l_{Log}). The length of the log is the distance between the edge of the stump and the top cut as shown in figure below. This distance can often be the distance between the top of the piece and the bottom of the crown left in the forest. This measurement is crucial and requires high level of accuracy, even though it may require some judgment.

Important:

- a. If tree has not yet been removed, field crew must assess location where bole will be cut at the bottom (if lower portion of bole will not be taken as a log) and at the top (at the base of the crown), and then measure this distance, which represents the length of the log. Expert knowledge will be necessary to accurately ascertain where the cuts will occur – this should be attained by having team members who have previously participated in tree harvests.
- b. If tree has moved during or after felling (i.e. slid due to slope, dragged with skidder to facilitate consecutive cuts, etc), field crew must assess the distance it moved (i.e. distance from stump or top of the piece to bottom of the log) to accurately measure the length of the log. The distance the felled tree has moved can be often identified by saw-dust vestiges in the forest floor indicating wood cutting, dragging marks from the bole

scrapping the forest floor, dragging markings from skidder or skidder-cable on the forest floor, etc.

6. Measure the avoidable merchantable waste in the main stem after bole branches off, from the top cut to the minimum diameter accepted by the mill. Measure the length (l_{AMW}) and the top diameter of this piece (d_{AMW-T}).



Measurements required in a logging plot.

Where:

1. Length of the log (l_{Log})
2. DBH
3. Diameter at the top cut (d_{Top})
4. Diameter of the stump (D_{Stump}) (and diameter of bottom of the log if no piece present – d_{Bottom})
5. Height of the stump (H_{Stump})
6. Length of the piece (l_{Piece})
7. Diameter of the bottom of the piece ($d_{Piece-B}$)
8. Diameter of the top of the piece ($d_{Piece-T}$) (and diameter of bottom of the log – d_{Bottom})

Different scenarios may be faced by field crews when implementing the “Logging Plots”. Thus a diagram outlining the different possibilities and providing the appropriate measurements to conduct under such circumstances is provided below.

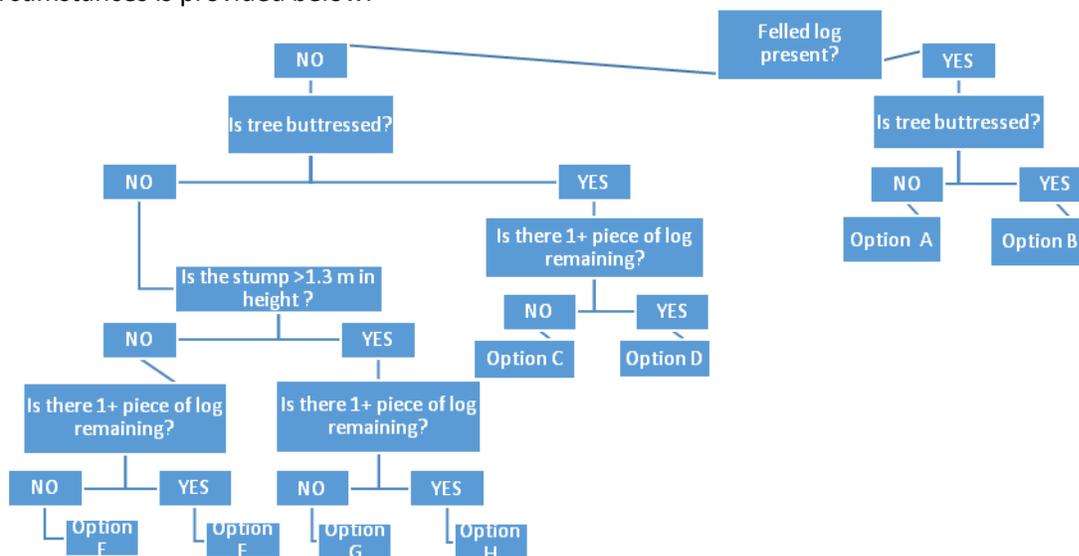


Figure 25: Diagram of different possibilities faced by field crew.

Below are the measurement field crew should take from felled tree under the different circumstances encountered in the field.

Option A

Take measurements: 1, 2, 3, 4, 5,

Option B

Take measurements: 1, 2, 3, 4, 5, and, if possible, measure the height of the buttress (H_{Buttress}).

Option C

Take measurements: 1, 4, 5, Also estimate the length of the log (3) and, if possible, measure the height of the buttress (H_{Buttress}).

Option D

Take measurements: 1, 4, 5, 6, 7, 8. Also estimate the length of the log (3) and, if possible, measure the height of the buttress (H_{Buttress}).

Option E

Take measurements: 1, 4, 5. Also estimate the length of the log (3).

Option F

Take measurements: 1, 4, 5, 6, 7, 8. Also estimate the length of the log (3) and, if possible, measure the DBH (2) in piece of log.

Option G

Take measurements: 1, 2, 4, 5. Also estimate the length of the log (3) and, if possible, measure DBH (2).

Option H

Take measurements: 1, 2, 4, 5, 6, 7, 8. Also estimate the length of the log (3), if possible, measure DBH (2).

Incidental damage measurements:

When a timber tree is felled, it incidentally damages the residual stand in two main ways: 1) by knocking down, uprooting or breaking other trees and 2) breaking off large branches of surviving trees.

Measurements of incidental damage should be conducted as follow:

1. Walk along the area where timber tree fell in a clockwise direction starting from the stump, and identify all trees significantly damaged and branches broken off due felling the timber tree.
 - a. Measure the DBH (≥ 10 cm) and note the species of all trees that are either uprooted or are snapped 1m or less above ground. Follow good practices outlined in 'SOP for Measurements of Trees' for measuring DBH. Do not measure any pre-existing dead trees.
 - i. Classify the damaged trees into the following classes:
 1. Uprooted, lying on ground (G)
 2. Crown snapped off (S)

Note: Bent or leaning trees are conservatively assumed to not be dead and will survive.

- b. Measure diameter of all significant braches (base diameter ≥ 10 cm) that have been damaged by felling the timber tree:

Note: It is very important that any large branches on the forest floor be clearly identified as originating from a surviving tree and not from an already measured damaged tree to prevent double counting. Efforts must also be taken to ensure branches were snapped during tree fall and do not represent down dead wood predating the harvest. Such branches should be sound, and have evidence of being relatively recently fallen (e.g. presence of leaves, twigs, complete bark, etc.).

Area of canopy opening

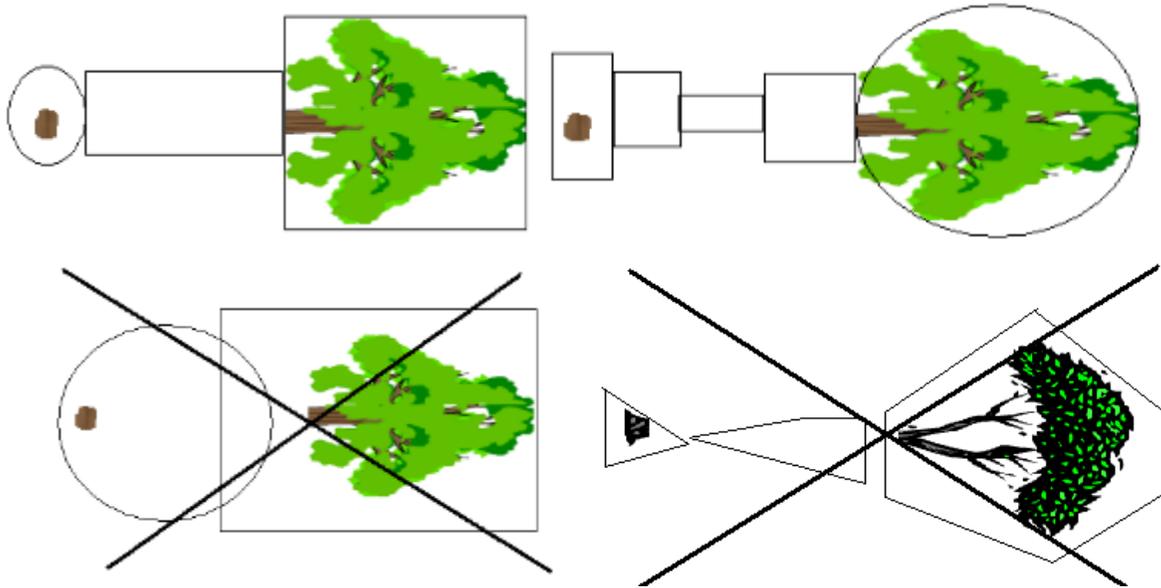
Field Equipment:

GPS receiver

Laser Range Finder

This SOP is used to estimate the area of canopy opening created when a tree is selectively logged in a forest. This method will be most accurate if done relatively soon after the tree is cut. This will most often be done in conjunction with 'SOP Carbon stock damage due to tree felling'.

1. Locate stump and crown of logged tree. Be sure to verify that the crown is from the selected stump by determining the angle of the tree fall, species and distance from stump. Search the surrounding area for other potential stumps.
2. Walk around the entire gap, locating every section of gap formed. Mentally divide the gap into different *non-overlapping* ovals or rectangles. Shapes must either be either: oval, circle, rectangle or square. There must be direct vertical penetration of light to the forest floor to qualify as gap. They cannot be complex shapes unless detailed angles are taken). Draw shapes onto data sheet.
3. Measure and record the length and width or diameter of the appropriate shape. **Remember** – to measure the area of an oval one must measure diameter of major axis *and* minor axis.



Carbon stock damage due to log extraction

Field Equipment:

GPS receiver
Laser Range Finder or Measuring tape

This SOP describes the methods used to estimate the carbon damages from the construction infrastructure used to remove logs out of the forest, such as: skid trails, new haul roads, and logging decks. The methods will be most accurate if done soon after the tree is cut. This will most often be done in conjunction with 'SOP Carbon stock damage due to tree felling'.

Assumptions

In this SOP, skid trail is a pathway travelled by ground skidding equipment while moving trees or logs to a landing. A skid trail differs from a skid road in that the ground surface is mainly untouched by the blades of earth moving machines. A logging deck is the centralized location where logs are gathered, delimbed and cut to length if necessary, and loaded on to log trucks for transport. A road is used by log trucks to take logs from the logging deck and ends at a pre-existing road or highway.

Skid trails:

In areas where skid trails are wide and completely cleared of vegetation:

1. Measure width of all skid trails at various random locations (at least 20 measurements per skid trail)
2. Measure DBH and species of all trees along the side of the skid trails that are clearly damaged (snapped or uprooted) due to skid trails construction.
3. Use tracking feature of the GPS to track entire length of skid trails.

- a. Collect waypoints at beginning and end of skid trail.
4. Calculate the area of skid trails by multiplying the average width by the total length
5. Multiply area of skid trails by carbon stock of stratum where skid trail is constructed. Note: This carbon stock impacted by skid trails is often smaller the total forest carbon stocks as skidder do not kill all trees to haul logs out of the forest, especially the trees with large DBH (e.g. DBH>50cm).
6. Divide result from 4 by cubic volume extracted from the gaps associated with the measured skid trail
7. Average across the skid trails measured in the concession



Skid trail in Guyana



Skid trail in Brazil

In areas where skid trails are narrow paths into the forest with live vegetation on the ground:

1. Measure the DBH and species of all trees clearly damaged (snapped or uprooted) due to skid trails construction.
2. Use tracking feature of the GPS to track entire length of skid trails.
 - a. Collect waypoints at beginning and end of skid trail.
3. Divide result from 2 by cubic volume extracted from the gaps associated with the given skid trail.
4. Average across the skid trails measured in the concession

Logging decks:

1. Measure at least 20 logging decks per concession by breaking down the area of the logging deck into simple geometric shapes (square, rectangle or circle). Draw sketch of the shape of entire logging deck in datasheet. Measure the sides/diameters of all shapes imagined, and record measurements in respective place (i.e. aside of drawn geometric shape) on the datasheet.
2. Multiply area of deck by carbon stock of stratum where deck is constructed.



Logging deck in Guyana

Roads

To calculate the impact of logging roads aerial imagery can be used to correlate area of roads with a measured stock for unlogged forest per unit area. If aerial imagery is not available:

1. Measure width of all haul roads at various random locations
2. If length of haul roads are not reported. Use tracking feature of the GPS to track entire length of roads. Otherwise, use reported length of logging roads.
 - a. Collect waypoints at beginning and end of haul road.
3. Calculate the area of roads by multiplying the average width by the total length.
4. Multiply area of road by the carbon stock of stratum where road is constructed.
5. Divide result from 4 by cubic volume extracted in the area where the roads are found for that year.



Logging road in Guyana

TIMBER TREE MEASUREMENTS

Date _____ \ _____ \ _____
 Plot ID #: _____ Location: _____ Coordinate System: _____
 Crew chief: _____ Data recorded by: _____ # people in crew: _____

 Start Time: _____ End time: _____ Total Time: _____ minutes
 Camera Number: _____ Photo Number(s): _____
 Forest type _____
 Additional notes describing plot area: _____

Timber Tree 1

Species: _____ GPS Accuracy: _____ (m)
 _____ (m)
 GPS Coordinarte: E: _____ N: _____

Timber Tree 2

Species: _____ GPS Accuracy: _____
 _____ (m)
 GPS Coordinarte: E: _____ N: _____

Tree Buttressed:			<input type="checkbox"/> Yes	<input type="checkbox"/> Not	Tree Buttressed:			<input type="checkbox"/> Yes	<input type="checkbox"/> Not
Height of the buttress (H_{Buttress})		_____	(cm)	Height of the buttress (H_{Buttress})		_____	(cm)		
Diameter of stump top (d_s)		_____	(cm)	Diameter of stump top (d_s)		_____	(cm)		
Height of the stump (H_s)		_____	(cm)	Height of the stump (H_s)		_____	(cm)		
DBH(dbh)		_____	(cm)	DBH(dbh)		_____	(cm)		
Log Section 1:	diam. bottom ($d_{\text{Piece-B}}$)	_____	(cm)	Log Section1:	diam. bottom ($d_{\text{Piece-B}}$)	_____	(cm)		
	diam. top($d_{\text{Piece-T}}$)	_____	(cm)		diam. top($d_{\text{Piece-T}}$)	_____	(cm)		
	length (l_{Piece})	_____	(cm)		length (l_{Piece})	_____	(cm)		
Log Section 2:	diam. bottom ($d_{\text{Piece-B}}$)	_____	(cm)	Log Section 2:	diam. bottom ($d_{\text{Piece-B}}$)	_____	(cm)		
	diam. top($d_{\text{Piece-T}}$)	_____	(cm)		diam. top($d_{\text{Piece-T}}$)	_____	(cm)		
	length (l_{Piece})	_____	(cm)		length (l_{Piece})	_____	(cm)		
Length of Log (l_{Log})		_____	(m)	Length of Log (l_{Log})		_____	(m)		
Log:			<input type="checkbox"/> Present	<input type="checkbox"/> Absent	Log:			<input type="checkbox"/> Present	<input type="checkbox"/> Absent
Diameter at top cut (d_T)		_____	(cm)	Diameter at top cut (d_T)		_____	(cm)		
Length of avoid. merchant waste (l_{AMW})		_____	(m)	Length of avoid. merchant waste (l_{AMW})		_____	(m)		
Diam. top of avoid. merchant waste($d_{\text{AMW-T}}$)		_____		Diam. top of avoid. merchant waste($d_{\text{AMW-T}}$)		_____			

Sketch of Canopy Gap: Canopy Opening Dimensions: _____

DAMAGED TREES MEASUREMENTS

Damage type: (S) snapped, (U) uprooted, or (B) branch (if larger than 10 cm in diameter)

Species	DBH	Type	Species	DBH	Type	Species	DBH	Type	Branches	D1	D2	Length

SKID TRAIL DATA SHEET

Skid Trail ID: _____ Location: _____ Date: ____/____/____

Crew Chief: _____ Coordinate System: _____

Skid Trail Widths: (m)

Fatally Damaged trees: (S) snapped, (U) uprooted

Species	DBH	Type									

Skid Trail ID: _____ Location: _____ Date: ____/____/____

Crew Chief: _____ Coordinate System: _____

Skid Trail Widths: (m)

Fatally Damaged trees: (S) snapped, (U) uprooted

Species	DBH	Type									

Skid Trail ID: _____ Location: _____ Date: ____/____/____

Crew Chief: _____ Coordinate System: _____

Skid Trail Widths: (m)

Fatally Damaged trees: (S) snapped, (U) uprooted

Species	DBH	Type									

LOGGINGDECK DATA SHEET

Date: ____/____/____
 Logging Deck ID: _____ Location: _____
 Polygon ID: _____ (Using polygon feature of GPS) **OR**
 Coordinate. System: GPS Waypoint E: _____ N: _____
 Logging Deck Dimensions: _____ Sketch of Logging Deck:

Logging Deck ID: _____ Location: _____
 Polygon ID: _____ (Using polygon feature of GPS) **OR**
 Coordinate. System: GPS Waypoint E: _____ N: _____
 Logging Deck Dimensions: _____ Sketch of Logging Deck:

Logging Deck ID: _____ Location: _____
 Polygon ID: _____ (Using polygon feature of GPS) **OR**
 Coordinate. System: GPS Waypoint E: _____ N: _____
 Logging Deck Dimensions: _____ Sketch of Logging Deck:

Logging Deck ID: _____ Location: _____
 Polygon ID: _____ (Using polygon feature of GPS) **OR**
 Coordinate. System: **WGS84** GPS Waypoint E: _____ N: _____
 Logging Deck Dimensions: _____ Sketch of Logging Deck:

Logging Deck ID: _____ Location: _____
 Polygon ID: _____ (Using polygon feature of GPS) **OR**
 Coordinate. System: GPS Waypoint E: _____ N: _____
 Logging Deck Dimensions: _____ Sketch of Logging Deck:

ROAD DATA SHEET

Road Track ID: _____ Location: _____ Date: ____/____/____
 Road Type: _____ Crew Chief: _____ Coordinate System:
 Road Width: (m)

Road Track ID: _____ Location: _____ Date: ____/____/____

Road Type: _____ Crew Chief: _____ Coordinate System:

Road Width: (m)

Road Track ID: _____ Location: _____ Date: ____/____/____

Road Type: _____ Crew Chief: _____ Coordinate System:

Road Width: (m)

Annex 10: Proposals for Stepwise Improvements

Deforestation

Activity data for deforestation will continue to be updated biannually to comply with UNFCCC-recommended reporting norms. Land cover maps will continue to rely on Landsat imagery, although future maps will use Landsat 8 imagery rather than Landsat 7. Images from other sources will be considered, especially radar-derived products such as PALSAR that avoid the issue of cloud cover, which is a common problem in Ghana. Pre-processing and classification will be standardized in the future to ensure greater compatibility between maps for more accurate change detection, and a standard country mask will be used to ensure accurate mapping along Ghana's borders. Research will be conducted on post-deforestation carbon stocks within Ghana to replace the literature-based stocks used in this reference level. This will allow for more accurate emission factors by better quantifying the growth of non-forest land cover types after deforestation events.

Carbon stock Enhancements:

A centralized, comprehensive database of carbon stock enhancements undertaken under the NFPDP would represent a stepwise improvement of measurement and monitoring for this activity. The database would maintain the following data carbon stock enhancement activities needed for accurate measuring and monitoring of this REDD+ activity under the ER program:

- **Spatial data on annual area planted under NFPDP funding.** This would include shapefiles of planted area so
- **Verified area planted**
- **Species composition**
- **Estimates plantation survival rates:**
 - Data collected in field surveys to verify area planted and estimate survival rate (within the year planting occurred)
 - Ongoing performance of planted area through assessment of a sample of all on-reserve planted areas within the GCFRP ACCOUNTING AREA using Google Earth

Timber Harvesting

Legal Timber Harvesting

The main improvement necessary for legal timber harvest is to improve the logging infrastructure factor (LIF) estimate. This can be done by correlating the measurements taken in the fieldwork undertaken in May 2016 by the Forestry Commission with timber extracted for those specific location.

Illegal Timber Harvesting

Given the nature of this activity, it is difficult to gather comprehensive estimate of total timber extracted from illegal practices. However, it will be important to develop a systematic approach to assess the impact of this activity on the ER-Programs' total emissions.

The AD used for the RL provides an estimate of timber volume for the year 2009 based on the methodology used by Hansen et al. 2012. While this estimate provides a useful proxy for the RL, the study has not been replicated to date.

The Forestry Commission has begun gathering data on illegal logged timber based on what rangers at the district level confiscate from illegal loggers. These data exist for 2013-2015 and so could be a source of data for monitoring illegal timber harvesting in the future. However, it should be noted that these data are based on what rangers are able to confiscate on forest reserves, thus represent only a portion of the actual illegally logged timber. Furthermore, at this stage, it is understood that these data remain incomplete, even within the forestry reserves. Under the ER-Program incentives should be provided to rangers and other stakeholders in the GCFRP ACCOUNTING AREA to encourage a significant increase in monitoring at the scale of HIAs, using the reporting methods developed by RMSC. These data can be aggregated at the FSD's District Manager level and reported back to RMSC.

The other option is to follow the methods outlined in Hansen et al 2012 and conduct a similar study, systematically to establish estimate every two years.

Woodfuel Collection

While the analysis of emissions from historic woodfuel collection generated for the development of the GCFRP ACCOUNTING AREA reference level represents what can be considered an IPCC Tier 2 approach (see Bailis et al. 2015¹⁰⁴), there are opportunities for stepwise improvements to the emission estimates by integrating more spatially explicit or country-specific data inputs to the WISDOM model. Furthermore, the emissions estimated for the RL represent those for the year 2009, and thus updated data to apply to the WISDOM model will be necessary for tracking emissions during the MRV period.

The following suggestions for updating and improving WISDOM estimates for Ghana were developed in association with Rudi Drigo, the co-author of the WISDOM model. Stepwise improvements could be made both in the data applied to the WISDOM model, along with the development of in-country capacity for applying the model. Updates to estimated emissions from woodfuel use would be necessary for monitoring emissions from this activity under the ER-Program for the GCFRP ACCOUNTING AREA, but would also likely be important if Ghana were to expand its REDD+ program to the national level, given emissions from this activity are assumed to be more significant outside the GCFRP ACCOUNTING AREA.

The WISDOM model can be tailored to fit Ghana's needs in terms of geographic scope (ecozones such as the GCFRP ACCOUNTING AREA or appropriate subdivisions within the ecozones), and consists of modules on demand, supply, integration and woodshed analysis. Each module requires different competencies and data sources and its contents are determined by the data available or, to a limited extent, by the data purposively collected to fill critical data gaps. Information of relevance to wood energy comes from multiple sources, ranging from census data to local pilot studies or survey data.

Demand:

Woodfuel demand is largely a function of population and population density, infrastructure, household energy supply needs, and access to woodsheds. As such, *the following sources of data can support the estimation of woodfuel demand specifically for Ghana and its ecozones:*

- *Population census*
- *Spatial data on infrastructure (e.g., roads, gas pipelines)*
- *Topography*
- *Surveys of household energy needs and use*

Supply:

Woodfuel supply is a measure of both the existing biomass in woodsheds as well as their productivity. Productivity is an important consideration as it accounts for the ability of biomass stocks to regenerate once harvested for woodfuel use).

The following sources can contribute to the estimation of woodfuel supply in Ghana:

- Biomass Stocks (stocks could be tailored to match FPP data)
- Productivity (mean annual increment)

Integration

Use of spatial data to estimate the demand and supply balance of woodfuel, specific to the desired spatial resolution. This will identify areas of deficit, surplus, and can help plan for future scenarios.

Woodshed analysis

The analysis for the delineation of woodsheds in Ghana, i.e. supply zones of specific consumption sites requires additional analytical steps that may be summarized as:

- Mapping of potential "commercial" woodfuel supplies suitable for urban, peri-urban and rural markets.
- Definition of woodsheds, or woodfuel harvesting areas, based on the level of commercial and non-commercial demand, woodfuels production potentials and physical/economic accessibility parameters. Estimation of harvesting sustainability, of woodfuel-related fNRB values at subnational level and of woodfuel induce forest degradation rates.

¹⁰⁴<http://www.nature.com/nclimate/journal/v5/n3/full/nclimate2491.html?message-global=remove>

Forest fire

Although the MODIS burned area product will continue to be used in the short term, more accurate, higher-resolution alternative activity data sources will be researched for long term use. These could include a Landsat-based burned area product or higher-resolution data sources. This higher-resolution option would allow for more accurate detection of small degradation fires that likely go undetected by MODIS. Research will be performed to calibrate such burned area products to Ghana specifically instead of using global algorithms.

Research will also be conducted to provide more accurate, ecozone-level combustion factors to improve the emissions estimations from fire.

Annex 11: Estimates for Woodfuel Emissions by District

(Estimates are for the year 2009, but were extrapolated over the entire reference period.)

State	District	Non-renewable biomass	With Expansion Factor (1.32)	Emissions t CO ₂ /yr
Ashanti	Adansi North	11025.76	14554.00	26,682
Ashanti	Adansi South	13931.45	18389.52	33,714
Ashanti	Ahafo Ano North	5435.39	7174.71	13,154
Ashanti	Ahafo Ano South	9795.94	12930.64	23,706
Ashanti	Amansie Central	10528.10	13897.10	25,478
Ashanti	Amansie East	6451.26	8515.67	15,612
Ashanti	Amansie West	8503.48	11224.59	20,578
Ashanti	Asante Akim South	6891.82	9097.20	16,678
Ashanti	Atwima Mponua	12807.44	16905.83	30,994
Ashanti	Atwima	8778.02	11586.98	21,243
Ashanti	Bosomtwe-Kwanwoma	9926.70	13103.24	24,023
Ashanti	Ejisu-Juabeng	9823.47	12966.98	23,773
Ashanti	Kumasi	72803.48	96100.59	176,184
Ashanti	Kwabre	23744.18	31342.31	57,461
Ashanti	Obuasi Municipal	5502.98	7263.93	13,317
Brong Ahafo	Asunafo North	3023.61	3991.16	7,317
Brong Ahafo	Asunafo South	2259.28	2982.24	5,467
Brong Ahafo	Asutifi	2896.93	3823.95	7,011
Brong Ahafo	Dormaa	5123.32	6762.78	12,398
Brong Ahafo	Tano North	1837.72	2425.79	4,447
Central	Asikuma Odoben Brakwa	6190.06	8170.88	14,980
Central	Assin North	6595.68	8706.30	15,962
Central	Assin South	7259.09	9582.00	17,567
Central	Lower Denkyira	9560.66	12620.07	23,137
Central	Upper Denkyira	6506.14	8588.10	15,745
Eastern	Atiwa	5501.38	7261.82	13,313
Eastern	Birim North	8343.08	11012.86	20,190
Eastern	Birim South	11585.25	15292.54	28,036
Eastern	East Akim	5623.79	7423.41	13,610
Eastern	Fanteakwa	5478.67	7231.84	13,258
Eastern	Kwabibirem	10795.99	14250.71	26,126
Eastern	Kwahu West	2597.61	3428.85	6,286
Eastern	West Akim	9264.63	12229.32	22,420
Western	Ahanta West	3483.03	4597.61	8,429
Western	Aowin-Suaman	4666.98	6160.41	11,294
Western	Bia	3336.68	4404.42	8,075
Western	Bibiani Anhwiaso Bekwai	3289.88	4342.64	7,962
Western	Jomoro	3900.48	5148.64	9,439
Western	Juabeso	4523.94	5971.60	10,948
Western	Mpohor Wassa East	6185.96	8165.46	14,970
Western	Nzema East	5617.29	7414.82	13,594
Western	Sefwi Wiawso	5913.20	7805.42	14,310

Western	Wasa Amenfi East	2572.61	3395.85	6,226
Western	Wasa Amenfi West	5363.01	7079.17	12,978
Western	Wassa West	7736.48	10212.15	18,722
TOTAL				926,816

Annex 12: Capacity Building

This annex includes capacity building conducted and planned to support the Forestry Commission in the assessment of emissions for the development of a reference level and MRV system.

Technical field training on estimating carbon emissions from selective logging.

Training Participants: RMSC, FSD, CCU and IUCN.

Training lead by AGS with support from Winrock

Resource Management Support Centre of the Forestry Commission, Kumasi April 2015

The objective of this training is to support the Ghana Forestry Commission in the measurements and data analysis necessary to estimate emissions from forest degradation and provide guidance on estimating historic emissions and reference level development.

Winrock conducted a training that focuses on estimating emissions from timber harvesting, while providing guidance on other sources of degradation. Winrock has designed an innovative, participatory and field based training program on estimating emissions from selective logging.

The objectives of this training were to strengthen the capacity of the Ghana Forestry Commissions in the following topics:

- Field methods for estimating the carbon impacts of selective logging activities
- Overview of forest stratification
- Overview of geospatial data acquisition
- In class training on the development of emission factor from selective logging
- In class training on the Forest Carbon Partnership Facility (FCPF) REDD+ Decision Support Tool. Available here: <http://redd-dst.ags.io/>
- Working with Ghana to determine likely impacts of illegal timber harvesting and if necessary sampling methods to allow an extrapolation from legal logging totals to illegal logging totals

Two scientists from Winrock lead this training: Alexandre Grais and Gabriel Sidman, from April 13-17. The sections below outline the training agenda and provide some supporting information on the field measurements and class room training program.

Training Agenda

Time	ACTIVITES	LOCATION
Sunday, April 12		
	Winrock experts arrive in Accra	Accra
Monday, April 13		
7h00 – 12h00	Travel to Kumasi	
1h00 – 1h45	Opening of the training (Mr. Bamfo)	Class room at Resource Management Support Centre of the Forestry Commission in Kumasi
1h45-2h00	Introductions, overview of training goals and objectives	
2h00 – 3h00	Hands on training on FCPF REDD+ DST, available here: http://redd-dst.ags.io/ and overview of the carbon impacts from selective logging and significance of fire and fuel wood in Ghana	
3h00 – 3h15	Coffee Break	
3h15 – 5h00	Overview of estimating annual emissions and Reference Level (SOP 011/SOP 001)	
Tuesday, April 14		
8h30-9h30	Introduction to use of geospatial data for REDD+	Class room at Resource Management Support Centre of the Forestry Commission in Kumasi
9h30 – 10h30	Overview of Acquisition of RS Data and Generation of Spatial Activity Data (SOP 003)	
10h30-10h45	Coffee Break	

10h45-12h00	Stratification (SOP 003) Identifying natural forest vs cocoa plantation	
12h00-1h00	Lunch	
1h00-1h45	Activity Data for deforestation (SOP001)	
1h45-2h30	Emission Factors for deforestation (SOP001)	
2h30 – 3h00	Combining Emission factors and activity data to get historical emissions (SOP001)	
3h00 – 3h15	Coffee Break	
3h00 – 4h00	Overview of the carbon impacts from selective logging and discussion of significance of illegal logging in Ghana (SOP 008)	
4h00 – 5h00	Overview of Quality Assurance/Quality Control (QA/QC) methods for estimating carbon impacts from selective logging	
Wednesday, April 15		
5h00 – 8h30	Travel to logging plots in Asenayo Forest Reserve	Asenayo Forest Reserve in the Nkawie Forest District Logging concession, field training
8h030– 12h00	Establishment of logging plots in recently logged forest – first two plots will be demonstration with full team. For subsequent plots, we will split into two teams. Each plot should take roughly 30 min. Depending on distance between logging plots, we can cover 2 to 3 plots per hour.	
12h00-12h30	Lunch in the field	
12h30 – 5h00	Establishment of logging plots in recently logged forest. In the afternoon. Participants will lead measurements with oversight by Winrock trainers.	
5h00 – 7h00	Travel back to Kumasi	
Thursday, April 16		
08h30-10h00	Recap of measurements taken in the field Overview of calculations to estimate emissions from selective logging	Class room at Resource Management Support Centre of the Forestry Commission in Kumasi
10h00-10h15	Coffee Break	
10h15-12h00	Introduction and Hands-on training on data entry and analysis for estimation of carbon impacts from selective logging, QA/QC protocols, and calculation of field measurement error. Focus on extracted log emissions (ELE) (SOP 008)	
12h00-1h00	Lunch	
1h00-3h00	Discussion of and presentation on remote sensing analysis of logging infrastructure (SOP 008/SOP 003)	
3h00-3h15	Coffee Break	
3h15-5h00	Hands-on training on data entry and analysis for estimation of carbon impacts from selective logging, QA/QC protocols, and calculation of field measurement error Focus on logging infrastructure factor (LIF) (SOP 008)	
Friday, April 17		
08h30-10h00	Hands-on training on data entry and analysis for estimation of carbon impacts from selective logging, QA/QC protocols, and calculation of field measurement error Focus on logging damage factor (LDF) (SOP 008)	Class room at Resource Management Support Centre of the Forestry Commission in Kumasi
10h00-10h15	Coffee Break	
10h15-12h00	Discussion and development of sampling scheme for incorporation of illegal logging (SOP 004/008)	
12h-1h00	Lunch	
1h00-3h45	Combining logging factors with activity data to estimate emissions from logging (SOP 008/SOP001)	
3h45-4h00	Coffee Break	

4h00-5h00	Training Summary, final question and answer summary and training wrap up	
Saturday, April 18 and Sunday April 19, 2014		
Travel back to Accra		Accra

General Description

The change in carbon stocks between “before-logging” and “after-logging” scenarios is a result of the extraction of timber, the damage caused to residual trees as a result the logging activities, and the removal of trees due to the construction of roads, skid trails and logging decks.

Measurements will take place in logged blocks. If possible, the logged areas should be those that have been harvested recently (i.e., within the past few months) or, more preferably, those that are actively being harvested during the time of the site visit so that cut logs are still on site. Non-destructive measurements to be conducted in each logging gap will include:

- Measurements on the stump and crown of the harvested tree;
- Measurements of any pieces of the bole left behind on the forest floor;
- Measurements of the felled timber tree (if still on site);
- Measurements of any trees severely damaged as a result of logging operations;
- Measurements of the size of the canopy opening (gap);
- Dimensions of roads and skid trails;
- Area of any land-based logging decks

Relationships are then created between harvested volumes and:

- Emissions from felled tree and trees damaged during tree felling;
- Area and hence emissions from infrastructure for timber extraction;
- Legal and illegal timber.

Training on improved land cover mapping in Ghana for emissions from deforestation and degradation from fire - Identification of cocoa, oil palm & rubber plantations. Training on identifying degradation from fire.

Training Participants: GIS and remote sensing specialists.

Training lead by AGS with support from Winrock

RMSC Geospatial Lab, Kumasi July 11-13 2016

Day 1: Workshop. A series of presentations and discussion sessions regarding land cover mapping in Ghana with a broad FC stakeholder audience

9:00 AM –Opening remarks and introductions– CCU, Winrock

9:30 AM – Overview of Ghana’s National Forest Monitoring System and links with Carbon Fund and UNFCCC –Winrock

10:00 AM – Introduction to mapping tree crops and plantations with remote sensing – AGS[*Introduce some technical concepts and issues, but keep at a relatively high level for a general audience*]

Includes Why map tree crops and plantations? Benefits and challenges

11:00 AM – BREAK

11:15 AM – Strata used and emission factors associated with tree crops and plantations – Winrock

12:30 PM – LUNCH BREAK

1:15 PM – Steve and AGS team installs and tests any additional software

2:15 PM – Training begins in lab. Introductions

2:45 AM - Acquiring and preprocessing optical and radar remote sensing data[includes review of required data sets; introduction to websites for downloading data sets; conversion to reflectance and backscatter; cloud screening; quality assessment.]

4:45 PM – Questions and Discussion regarding acquiring and preprocessing

5:00 PM – END MEETING

Day 2: Training.

8:00 AM – Adjustments to software systems in lab, if necessary

9:30 AM – Review the collection and processing of field observations and digitizing using Google Earth Pro [includes requirements for sampling; screening for consistency and bad data; converting data into csv table format for use with RS observations]

11:00 AM – BREAK

11:15 AM – Introduction to supervised classification techniques using decision trees and random forest classifiers (GARSeCT)

12:30 PM – LUNCH BREAK

1:30 PM – Resume supervised classification techniques using decision trees and random forest classifiers

3:00 PM – BREAK

3:30 PM – Validation, revision, and uncertainty assessment

5:00 PM – END OF TRAINING DAY

Day 3: Training.

8:00 AM – Adjustments to software systems in lab, if necessary

9:00 AM – Work through an example from start to finish

10:30 AM – BREAK

10:45 AM – Continue working through example

12:00 PM – LUNCH BREAK

1:00 PM - Discussion/questions on AGS approach

1:30 PM – Introduction to using MODIS to identify forest degradation from fire. – Winrock

1:30 PM – Hands on exercise using GCFRP ACCOUNTING AREA layers to identify area of fire in GCFRP ACCOUNTING AREA for 2000, 2010 2012 and 2015, including differentiating between

3:00 PM – BREAK

3:15 PM – Hands on exercise continued to match with RL analysis

4:30 PM – Round table discussion on developing step by step SOPs to ensure quality control of data entry in the future and development of SOP outline.

5:30 PM – END OF TRAINING DAY

Training on reference level/MRV tool.

Training Participants: CCU, RMSC, FSD.

Training lead by Winrock

Resource Management Support Centre of the Forestry Commission in Kumasi, July 14-16, 2016

Day 1: Introduction to RL/MRV and deforestation emission estimates.

8:00 AM – Training overview and goals introduction. CCU and Winrock

8:30 AM – Overview of Ghana's National Forest Monitoring System and links with Carbon Fund and UNFCCC - This initial presentation will be designed to give participants an overview of the UNFCCC and Carbon Fund context for a REDD+ mechanism and an overview of in the inputs for the GCFRP ACCOUNTING AREA RL, key decisions made and an overview of which institutions will be responsible for which aspects of the MRV and what their roles will be. The purpose is to prepare participants for the presentation of more technical information, and to define key concepts and technical terms that will be used throughout the workshop

10:30 AM – BREAK

10:45 AM – Presentation on the data used and assumptions made to calculate emissions from deforestation for the GCFRP Accounting Area. Explanation of EF and AD calculations

12:00 PM – LUNCH BREAK

1:00 PM – Overview of the deforestation component of the reference level and MRV tool

1:30 PM - Hands on exercise using actual data to estimate emissions from deforestation for the reference level and for the monitoring period using excel based tool

3:00 PM – BREAK

3:15 PM – Hands on exercise continued to match with RL analysis

4:00 PM – Round table discussion on developing step by step SOPs to ensure quality control of data entry in the future and development of SOP outline.

5:00 PM – END OF TRAINING DAY

Day 2: Training. Degradation estimates.

8:00 AM – Overview of the different components of forest degradation included in the RL

8:30 AM – Presentation on the data used and assumptions made to calculate emissions from degradation from timber harvest (legal and illegal) for the GCFRP Accounting Area. Explanation of EF and AD calculations

10:00 AM – Overview of the legal and illegal timber harvest component of the reference level and MRV tool

10:30 AM – BREAK

10:45 AM – Hands on exercise using actual data to estimate emissions for degradation from timber harvest for the reference level and for the monitoring period using excel based tool

12:00 PM – LUNCH BREAK

1:00 PM - Presentation on degradation from fire and the data used and the assumptions made to estimate emissions

2:30 PM – Hands on exercise using actual data to estimate emissions for degradation from timber harvest for the reference level and for the monitoring period using excel based tool

3:00 PM – BREAK

3:15 PM – Hands on exercise continued to match with RL analysis

4:00 PM – Round table discussion on developing step by step SOPs to ensure quality control of data entry in the future and development of SOP outline.

5:00 PM – END OF TRAINING DAY

Day 3: Training. Enhancement of forest carbon stocks and degradation from fuelwood.

8:00 AM – Presentation on the data used and assumptions made to calculate removals from forest carbon stock enhancements for the GCFRP Accounting Area. Explanation of removal factors and AD calculations

10:00 AM – Overview of the enhancement component of the reference level and MRV tool

10:30 AM – BREAK

10:45 AM – Hands on exercise using actual data to estimate emissions for degradation from timber harvest for the reference level and for the monitoring period using excel based tool

12:00 PM – LUNCH BREAK

1:00 PM - Presentation on the WISDOM model used to estimate emissions from forest degradation from fuel wood.

2:00 PM – Discussion on data inputs needed for WISDOM model and use in MRV

3:00 PM – BREAK

3:15 PM – Round table discussion on developing step by step SOPs to ensure quality control of data entry in the future and development of SOP outline.

4:30 PM – Distribution of certificates of completion

5:00 PM – END OF TRAINING DAY

