

Advisory

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# ***Forestry Commission Ghana***

## **National REDD+ Strategy**

January 2015

Final



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# Caveat

*This report has been prepared for and only for the Forestry Commission in accordance with our contract of October 23rd 2013, and for no other purpose. We do not accept or assume any liability or duty of care for any other purpose or to any other person to whom this report is shown or into whose hands it may come save where expressly agreed by our prior consent in writing.*

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# List of Acronyms

Acronyms	Meaning
ACR	American Carbon Registry
ADR	Alternative Dispute Resolution
AGB	Above Ground Biomass
CBD	Convention on Biological Diversity
CCBA	Climate, Community and Biodiversity Alliance
CO <sub>2</sub>	Carbon Dioxide
COCOBOD	Ghana Cocoa Board
COP	Conference of Parties
CRIG	Cocoa Research Institute of Ghana
CRMA	Community Resource Management Areas
CRMC	Collaborative Resource Management Committees
CSRI	Council for Scientific and Industrial Research
DDRT	District Dispute Resolution Team
DRM	Dispute Resolution Mechanism
EPA	Environmental Protection Agency
ER-PIN	Emission Reductions Programme Idea Note
FC	Forestry Commission
FCPF	Forest Carbon Partnership Facility
FIP	Forest Investment Program
FLEGT	Forest Law Enforcement Governance Trade
FPP	Forest Preservation Project
FORIG	Forestry Research Institute of Ghana
GHG	Greenhouse Gas
GPRS	Ghana Poverty Reduction Strategy
GLAS	Geoscience Laser Altimeter System
GOG	Government of Ghana
IPCC	Intergovernmental Panel on Climate Change
MDG	Millennium Development Goals
MESTI	Ministry of Environment, Science, Technology and Innovation
MLNR	Ministry of Land and Natural Resources
MMR	Measurement, Reporting and Verification
MMRV	Monitoring Measuring Reporting and Verification
MODIS	Moderate Resolution Imaging Spectroradiometer
MOE	Ministry of Energy
MOFA	Ministry of Food and Agriculture
MRV	Measurement, Reporting and Verification
M2RV	Measurement (M2), Reporting and Verification
NDRT	National Dispute Resolution Team
NGO	Non-Governmental Organisations
NFI	National Forest Inventory
NGHGI	National Greenhouse Gas Inventory
NREG	Natural Resources and Environmental Governance Programme
NRS	National REDD+ Strategy
NRSC	National Remote Sensing Centre.
REDD+	Reducing Emissions from Deforestation and forest Degradation
RE	Remote Sensing
R-PIN	Readiness Project Idea Note
R-PP	Readiness Preparation Proposal

<b>Acronyms</b>	<b>Meaning</b>
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VPA	Voluntary Partnership Agreement
WWF	World Wildlife Fund



The Chief Executive  
Forestry Commission  
P O Box MB 434 Accra  
Location: Kisseman  
West Legon

10 February 2015

Dear Sir

**Subject: Development of the Ghana National REDD+ Strategy**

PricewaterhouseCoopers (Ghana) Limited ("PwC") has the pleasure to present to you our Final Report ("Final Report" or "the Report" in accordance with your instructions as confirmed in our contract of 23 October 2013 for the provision of the above-referenced professional services. This Final Report has been prepared as the final output of that service.

Any liability that PwC assumes to Forestry Commission ("FC") in respect of this Report will be governed by the 23 October 2013 Contract. PwC will accept no liability (whether in contract, tort – including negligence -, or otherwise) to any other person in respect of this Final Report.

The development of the Ghana National REDD+ Strategy seeks to create an inclusive and participatory platform where Government, Communities and Institutions collaborate for the effective implementation of REDD+. This document outlines the preferred Strategic Interventions of REDD+ in Ghana over the next 10 years.

Should you require any clarification on any aspect of this document, please do not hesitate to contact me at [vish.ashiagbor@gh.pwc.com](mailto:vish.ashiagbor@gh.pwc.com), or Venan Sondo at [venan.sondo@gh.pwc.com](mailto:venan.sondo@gh.pwc.com).

Yours sincerely

**for: PricewaterhouseCoopers (Ghana) Limited**

A handwritten signature in black ink, appearing to read 'Vish Ashiagbor'.

Vish Ashiagbor  
Director



# *Executive Summary*

## ***Background***

Ghana joined the international REDD+ Readiness Programme through the World Bank's Forest Carbon Partnership Facility (FCPF) in 2008 and prepared its REDD+ Readiness Preparation Proposal (R-PP) which was approved in 2010. This paved the way for the Government of Ghana to effectively prepare towards implementing the international mechanism REDD, outlined in the Bali Action Plan.

The R-PP outlines the process by which the Government of Ghana will develop its National Strategy and the supporting mechanisms and processes for participating in and implementing REDD+. These mechanisms encompass reducing emissions from deforestation and forest degradation, to enhancing and conserving stocks in a longer term; aspects which constitute the fundamentals of Ghana's initiative in the readiness process towards a successfully implementation of REDD+.

## ***Ghanaian Context***

Ghana's current deforestation rate is an issue of grave concern considering the current rate of deforestation and forest degradation (2% annual loss of forest cover in Ghana). This poses a significant threat to ecosystem services and functions that support the predominantly agricultural economy and threatens the supply of foreign exchange from forest resources. Ghana's R-PP identified the principal drivers of deforestation and degradation as agricultural expansion (50%), wood harvesting (35%), population and development pressures (10%), and mining and mineral exploitation (5%). Unlike other REDD+ countries facing frontier deforestation, Ghana's deforestation pathway is one of incremental degradation leading to deforestation.

Recognising the national and global importance of this initiative, Ghana acknowledges that while the concept of REDD+ is relatively straightforward, the actions required to achieve REDD+ are complicated and multi-dimensional. The Ghana National REDD+ Strategy is therefore meant to serve as a guide and framework for achieving REDD+, providing an over-arching set of activities and priorities for the future, and not a policy that is set in stone. The Ghana National REDD+ Strategy (GNRS) will retain sufficient flexibility and openness such that it can be reviewed, modified, adapted and even re-written over time as conditions, experiences, and circumstances change, and as new opportunities emerge.

This report is therefore an analysis of context specific strategy options that the Government of Ghana will use in successfully implementing its R-PP towards a sustainable future REDD+ administration and implementation.

## ***Strategy Development***

Ghana REDD+ implementation has been formulated into three phases:

**Phase I:** Preparation and Design Phase (2008-2015), where Ghana will complete its REDD Readiness Preparation and submit its R-Package in late 2015 for international approval.

**Phase II:** Early Implementation, Monitoring, Performance Based Payments, Scaling Up (2016-2030), which will focus on implementing the Cocoa Forest REDD+ Program and associated activities with an initial monitoring is proposed for 2018 and

**Phase III:** Performance Based Payments, Consolidation, Determining Future of REDD+ (2021-2036), which marks the end of the Cocoa Forest REDD+ Program, as currently articulated.

During the primary stage (preliminary analytical stage), the potential for REDD+ in Ghana was identified, and the capacity to implement REDD+ assessed. Gaps and issues to be addressed were identified, including Ghana's Eco-zones, key drivers of deforestation and indication of priority sectors in Ghana's REDD+.

During the secondary analytical stage, thirteen options from the R-PP were assessed on five key parameters (economic impact, legal and institutional impact, social impact, environmental impact, and carbon sequestration potential). After this, various stakeholders on district, regional and national levels were consulted to seek their feedback and inputs. This resulted in a selection of three key strategic options including:

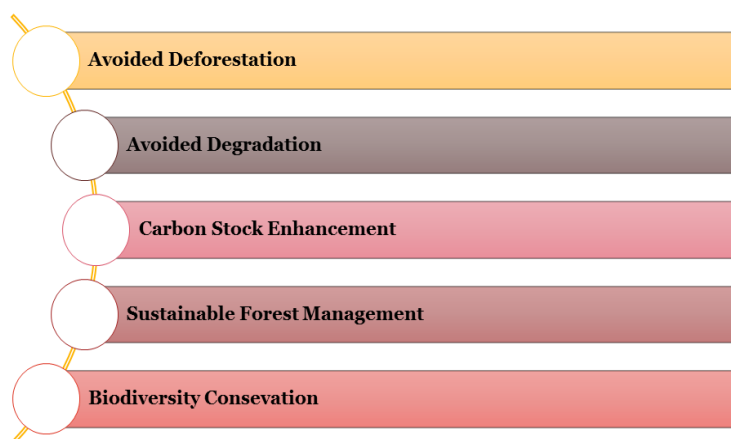
**Strategic Intervention 1:** Improving Land-use and socio-economic development in the High Forest Zone and cocoa growing areas.

**Strategic Intervention 2:** Addressing wood harvesting and agricultural practices in the ‘transition’ and savannah zone.

**Strategic Intervention 3:** Policy and legislative reforms to support REDD+ and a sustainable Forestry sector.

## ***The Strategy Formulation***

Ghana will aim for the full scope of the five main elements of REDD+ as shown in Plate 1:



*Plate 1: Five elements of REDD+*

Ghana will aim for the full scope of REDD+ in its strategy, but with due consideration of her ability to implement. Ghana will therefore implement the National REDD+ Strategy in a phased approach, in compliance with approved methodologies for monitoring deforestation (or afforestation) and accounting for emission reductions, sequestration, or other impacts. Therefore, during the initial phase of implementation of the REDD+ mechanism, Ghana's strategy will focus on Avoided Deforestation (AD), CSE, and biodiversity conservation while developing capacity for Sustainable Forest Management (SFM) during the implementation of on-going initiatives especially FLEGT-VPA. Under Ghana's

phased implementation of REDD+, forests are defined as forest patches, or assemblages of naturally regenerated tree that have at least 15% canopy cover, with an average height of 5 meters, and cover a minimum area of 1 hectare. This aligns with the Intergovernmental Panel for Climate Change (IPCC) and the Marakesh Accord.

## ***Ghana's REDD+ Vision, Goals & Objectives***

The Ghana National REDD+ Strategy (GNRS) is evidence that Ghana is committed to achieving REDD+ and changing the perception of the use of forest resources in the country. Ghana's Vision for REDD+ is to significantly reduce emissions from deforestation and forest degradation by 40% over the next ten years, whilst at the same time addressing threats that undermine ecosystem services and environmental integrity. By so doing, Ghana will become a pillar of action for the national climate change agenda and a leading pathway for sustainable, low carbon emissions development. The objectives for REDD+ in Ghana align with key National Development Plans for green growth. This include reducing emissions from deforestation and forest degradation, while preserving Ghana's forests resources and at the same time, transforming the agricultural sector, expanding platforms for cross-sector and public-private collaboration and generating innovative, substantial and sustainable economic and non-economic incentives to improve livelihoods across all regions in Ghana.

## ***The Strategy Implementation***

Ghana's commitment towards reducing emissions from forest degradation and deforestation is captured in the GNRS. Ghana will adopt a nested approach to implementation. The strategy will focus on the implementation of large scale, sub-national programs, which follow ecological boundaries or eco-zones 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.

The institutions with greatest responsibility towards ensuring successful implementation are those dealing with management of Ghana's natural resources, i.e. Forestry Commission, Ministry of Lands and Natural Resources, Ministry of Environment, Science, Technology and Innovation, Ministry of Food and Agriculture, Ghana Cocoa Board and Environmental Protection Agency. The implementation of the strategy is laid out in a multi-year plan, capturing Ghana's REDD+ goals and targets. It is evident that Ghana's national development agenda, policies and plans, in particular those with a focus on natural resource management, should incorporate the REDD+ agenda and vice versa.

Ghana's Forest Investment Program (FIP), which will invest US\$ 50 million into forestry, climate-smart agriculture, and CREMA related projects, covers some of the anticipated implementation of activities. The implementation of the strategy is built on the foundation of raising additional resources from development partners such as GEF, but also some should be absorbed by the national budget.

Mainstreaming of REDD+ activities happens across key institutions and should become part of daily activities. The required capacity that focuses on management and implementation has been ongoing, but requires additional effort. It should be noted that work done under additional consultancies under REDD+, under the management of the Forestry Commission's REDD+ secretariat will have additional recommendations that should be taken into consideration. The frameworks dealing with Strategic Social and Environmental Assessment (SESA), Grievance Mechanisms, Benefit Sharing as well as Monitoring, Reporting and Verification (MRV) are undergoing implementation within the boundaries of the strategy.

Ghana's REDD+ vision and goals should translate into concrete actions to curb deforestation and degradation, this can be done by linking efforts to the very drivers of deforestation in Ghana, such as cocoa. However, economic growth and national development goals should not be overlooked as this forms the basis of overall development of its economy, people and environment.

# 1. Introduction and Background

*“We have the blessing of the wealth of our vast resources, the power of our talents and the potentialities of our people. Let us grasp now the opportunities before us and meet the challenge to our survival.”*

*Dr. Kwame Nkrumah, Address to the National Assembly, 26 March 1965.*

## 1.1. The Global Context

Climate Change presents a significant threat to the wellbeing of mankind, and it is driven by the ever increasing quantity of greenhouse gases (GHG) being emitted into the atmosphere from anthropogenic sources. The Intergovernmental Panel on Climate Change (IPCC) has called for concerted action by all nations to limit their global GHG emissions. There is a global consensus that it will be practically impossible to limit the impacts of climate change without reducing emissions from the forestry and agricultural sectors; yet worldwide, forests continue to be lost at an alarming rate. Between 2000 and 2010 there was a global net loss of 6.2 million hectares of forests (FAO, 2010).

Forests provide vast carbon sinks that when destroyed emit carbon dioxide (CO<sub>2</sub>) into the atmosphere, either by burning or degradation of organic matter. CO<sub>2</sub> is one of the most potent greenhouse gases and the primary component of anthropogenic emissions. The conversion of forests to other land uses is responsible for around 10% of net global carbon emissions (IPCC, 2013). Therefore, addressing the problem of deforestation is a prerequisite for any effective response to climate change.

Reducing Emissions from Deforestation and forest Degradation (REDD+) is an international initiative that was formally launched in 2007 as part of the Bali Action Plan. REDD+ seeks to support and reward developing countries for reducing their emissions from deforestation and forest degradation.

To successfully implement REDD+, participating countries are required to embark on a readiness process that outlines a set of strategic activities that will be used to address the main drivers of deforestation and forest degradation.

Ghana joined the international REDD+ Readiness Programme through the World Bank's Forest Carbon Partnership Facility (FCPF) in 2008, and its REDD+ Readiness Preparation Proposal (R-PP) was approved in 2010. The R-PP outlines the process by which the Government of Ghana will develop its national strategy and the supporting mechanisms and processes for participating in and implementing REDD+.

## 1.2. The Ghanaian Context

Ghana's forest lands are endowed with a rich array of land based natural resources—Gold, Timber, Cocoa, Oil palm, and Shea—and the country has a strong commitment to democratic governance, and to civic and traditional leadership. But Ghana's growth and economic achievements have come at a significant cost to its forests. Having lost over 60% of its forest cover from 1950 to the turn of the last century (2.7 million hectares) (Owusu, et al., 1999), and considering the current deforestation rate of approximately 2% per year (135,000 ha/year), the future of Ghana's forests is in doubt.

Forest degradation and deforestation pose a significant threat to Ghana for two main reasons. Forests provide many unseen ecosystem services and functions that support the country's predominantly agricultural economy. As Ghana loses its forest ecosystem, it threatens the security of supply of some of the most important foreign exchange earners in the country. In addition, deforestation is a major global contributor to climate change

through the release of CO<sub>2</sub> emissions. Given that climate change poses a plethora of threats to Ghana as a result of projected increases in temperature and changes in rainfall patterns, the effort to adapt and mitigate to climate change is of paramount importance.

Ghana began its engagement in REDD+ in 2008 with the development of its Readiness Project Idea Note (R-PIN), and in 2010 received approval of its Readiness Preparation Proposal (R-PP). Since 2010, Ghana has been focused on REDD+ Readiness—building the needed capacity, understanding, architecture and systems to support the implementation and monitoring of REDD+ projects and programs. It is expected that by 2016 Ghana it will be ready to implement a series of activities and programs to reduce deforestation, and that in the ensuing five to ten years, it will broadly scale up and expand these interventions.

Since 2008, significant learning, debate, and action towards REDD+ has happened in Ghana, and numerous partners from civil society, the private sector, the government, and the realm of communities and traditional leaders have contributed to its evolving orientation and scope.

Recognising the national and global importance of this initiative, Ghana acknowledges that while the concept of REDD+ is relatively straightforward, the actions required to achieve REDD+ are complicated and multi-dimensional. The Ghana National REDD+ Strategy is therefore meant to serve as a guide and framework for achieving REDD+, providing an over-arching set of activities and priorities for the future. It is not, however, a policy that is set in stone. The Ghana National REDD+ Strategy (GNRS) will retain sufficient flexibility and openness such that it can be reviewed, modified, adapted and even re-written over time as conditions, experiences, and circumstances change, and as new opportunities emerge. This is against the backdrop that REDD+ is still fluid and negotiations at the global level has yet to be concluded.

#### Ghana's REDD+ Vision, Goals, Criteria and Principles

The GNRS is evidence that Ghana is committed to achieving REDD+ and changing the way that the country and its people have historically thought about, used, and benefited or not from its forest resources. Ghana's Vision for REDD+ is to significantly reduce emissions from deforestation and forest degradation by 40% over the next ten years, whilst at the same time addressing threats that undermine ecosystem services and environmental integrity. By so doing, Ghana will become a pillar of action for the national climate change agenda and a leading pathway for sustainable, low carbon emissions development.

The goals of REDD+ are to:

1. Reduce emissions from deforestation and degradation by at least 40% over ten years, while enabling carbon stock enhancement through sustainable forest management and tree planting;
2. Preserve Ghana's forests in order to sustain their ecosystem services, conserve biological diversity, and maintain a cultural heritage for generations to come;
3. Transform Ghana's major agricultural commodities into climate-smart production systems and landscapes;
4. Expand platforms for cross-sector and public-private collaboration and sustainable economic development;
5. Generate innovative, substantial, and sustainable economic and non-economic incentives and benefits to improve livelihoods across all regions of Ghana;

To realize this vision and its goals, actions in line with Ghana's NRS will maintain a focus on four key criteria for REDD+:

- *Economic development*—how does the activity contribute to the nation's development?
- *Environmental sustainability*—how does the activity ensure and contribute to the sustainable use of Ghana's forest resources?
- *Measurable*—how will the activity be monitored and can it produce measurable results?
- *Inclusive*—has the activity considered all possible stakeholders and engaged them in the process, with due consideration to their rights and the potential impacts?
- *Marketable*—how will the activity generate revenue and benefits, either through markets, funds, or alternative mechanisms?

Ghana recognizes that the REDD+ process will need to catalyse a major change in the way that Ghanaians think about the value of forests and the benefits and services that forests provide, and that it will have to drive a change in actions with respect to how forests are used. REDD+ will also need to usher in a new era of performance based management so that Ghana's forests, agroforestry systems, and plantations can be better protected and more sustainably managed for generations to come. Ghana aspires to become a continental leader in the development of programs and models on climate-smart agriculture and sustainable, integrated landscapes. Though REDD+ has largely been the domain of the government and NGOs, it must look to the private sector as an important partner and investor. REDD+ will have to facilitate change in tenure and rights regimes, decentralisation of landscape level planning, management, and monitoring of natural resources, and enforcement of laws. Finally, REDD+ will need to foster new types of economic opportunities, mechanisms, and incentives that strengthen natural resource governance and enable stakeholders and land users to prosper.

In pursuing REDD+, the following principles will guide all aspects of planning and implementation:

REDD+ should recognize and respect the rights of all people and segments of society, including land owners, land users, marginalized groups, and women and children.

- *REDD+ should be implemented through an open, inclusive, equitable, and transparent process at all levels and at all times.*
- *REDD+ should not be used to promote external interests or 'elite capture' at the expense of peoples', communities' or the Nation's interests.*
- *REDD+ should align with national development goals and aspirations.*

### **1.3. The Strategy Development Process**

Ghana's National REDD+ Strategy has been developed in a process that has benefited from several consultations and stakeholder engagements that occurred during the development of Ghana's R-PP, throughout the on-going readiness process, and during the development of Ghana's Forest Investment Program (FIP).

The analysis of strategic options consisted of a preliminary analytical phase which involved studies to identify the potential for REDD+ in Ghana, assess capacities for REDD+ implementation, and to identify gaps and issues to be addressed. Ghana's Eco-zones, key drivers of deforestation and indication of priority sectors in Ghana's REDD+ were also identified at this stage. The main analytical parameters with which to analyse the R-PP's strategy options were also determined and an Inception Report was completed at the end of this stage.

During the secondary analytical phase the main strategy options from Ghana's R-PP were analysed against five main parameters: economic impact, legal and institutional impact, social impact, environmental impact, and carbon sequestration potential.

Finally, in the tertiary analytical phase the draft strategy was shared with a broad range of stakeholders for their input and feedback. Specifically, two consultations were hosted by the Forestry Commission, and a third consultation took place with a small team of REDD+ experts. Six REDD+ and natural resource management experts also provided extensive input and analysis to strengthen the content and focus of the strategy. In drafting the strategy, the team was guided by the structure and content of the WWF Guide for Building REDD+ Strategies (2013). The REDD+ Strategy was informed by other national growth and development strategies such as the Forest and Wildlife Policy, the Emission Reductions Programme Idea Note (ER-PIN), Forest Investment Programme (FIP) and other strategies which contribute to effective conservation and utilisation of Ghana's natural and renewable resources.

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The document is structured along the three main themes: Achieving REDD+, REDD+ Governance, and Tracking REDD.

Section 1 of the Strategy—Introduction and Background, lays out the global and Ghanaian context of REDD+ and introduces the vision, goals, criteria and principals of the GNRS.

Section 2 of the Strategy—Achieving REDD+, provides an overview of the drivers of deforestation and degradation and an assessment of activities to reduce emissions from forest loss. It then describes the implementation approach for REDD+ in Ghana, and other key elements that define how REDD+ will work.

Section 3 of the Strategy—Governance, outlines the enabling environment and how it will support the implementation of REDD+ with respect to overall governance aspects of REDD+. This section will also identify risks associated with REDD+ and propose measures for mitigating them.

Section 4 of the Strategy—Tracking REDD+, outlines how REDD+ will be monitored and tracked for performance in Ghana.



## 2. Achieving REDD+

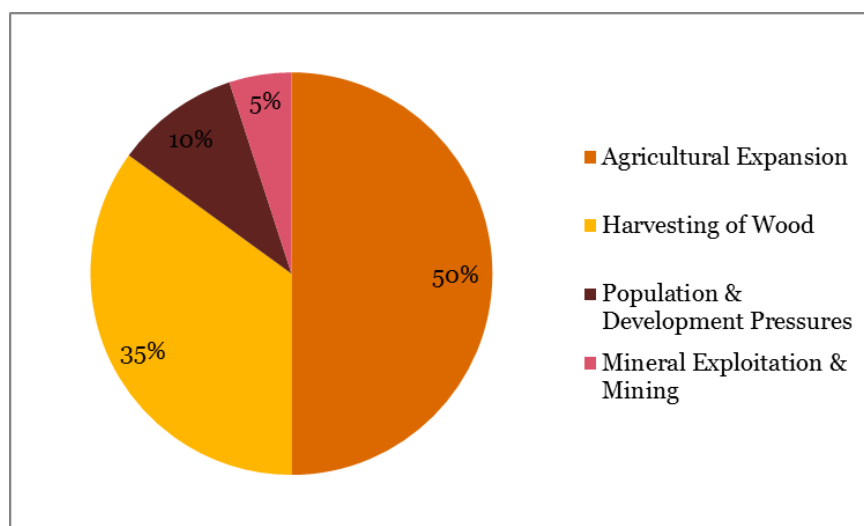
Ghana's ability to successfully address the drivers of deforestation and forest degradation in the short, medium and long term will ultimately make or break its REDD+ Strategy, regardless of whether the other building blocks are in place. The plan to achieve REDD+ is therefore paramount.

Establishing an inclusive and comprehensive national process is also crucial to the success of REDD+ in Ghana. No single institution, organization or individual can comprehensively address the key drivers of deforestation and forest degradation with due consideration to the existing legal, institutional, cultural and economic imperatives. Therefore, this section of the GNRS describes a broad plan for achieving REDD+, that when implemented should facilitate a positive process that invites widespread participation, information sharing, collaboration and dialogue.

### 2.1 Drivers of Deforestation & Degradation

Deforestation in Ghana is considered one of the highest in the World. At an annual rate of 2%, equivalent to 135,000 hectares per annum, remnant forests outside of the gazetted forest reserves are likely to be completely liquidated in the next 10 years, and the forest reserves will be under a more acute threat of encroachment and other illegal activities if very serious and concerted action to eliminate the threats is not taken.

Ghana's R-PP identified the principal drivers of deforestation and degradation as agricultural expansion (50%), wood harvesting (35%), population and development pressures (10%), and mining and mineral exploitation (5%) (Figure 1). Unlike other REDD+ countries facing frontier deforestation, Ghana's deforestation pathway is one of incremental degradation leading to deforestation.



*Figure 2-1: Principal Drivers of Deforestation and Degradation*

Table 2-1 provides a more detailed description of these direct drivers of deforestation and degradation in Ghana, and the associated indirect drivers. Direct drivers are activities or actions at the forest frontier that explicitly impact forest cover, whereas indirect drivers are the socioeconomic processes that shift the way that people behave at a macro level and would affect the direct driver.



Identifying and understanding the key drivers of deforestation and degradation is not a one-off activity as the conditions that influence people's decision making can change with time. Therefore, the GNRS recommends frequent review and ground-truthing of drivers in the hotspots of deforestation and degradation across the entire country. Only by continuing to evaluate the main drivers can the needed actions for achieving REDD+ remain relevant.

The problem of illegal small-scale mining ("galamsey") is one example of how the influence and impact of drivers can change. Though illegal mining has always been a problem, its impact on the landscape shot up in 2013 due to spikes in the global price of gold and the increasing availability of machines and expertise.

*Table 2-1: Direct and Indirect Drivers of Deforestation and Degradation (R-PP, 2010)*

<b>Direct Drivers</b>
<b>Agricultural Expansion</b> <ul style="list-style-type: none"> <li>• Cocoa</li> <li>• Other tree crop systems: Rubber, Citrus, Oil Palm, Coffee, Cashew, Mango</li> <li>• Food crop farming: Plantain, cassava, maize, yam; farmed under shifting cultivation using slash-and-burn.</li> </ul>
<b>Wood Harvesting</b> <ul style="list-style-type: none"> <li>• Illegal logging: Timber companies and chainsaw operations</li> <li>• Charcoal production: Unregulated</li> <li>• Other fuelwood harvesting</li> </ul>
<b>Population Growth &amp; Development</b> <ul style="list-style-type: none"> <li>• Population growth</li> <li>• Urban and rural settlement and expansion</li> <li>• Expansion of roads and infrastructure</li> </ul>
<b>Mining &amp; Mineral Exploitation</b> <ul style="list-style-type: none"> <li>• Mining inside Forest Reserves</li> <li>• Illegal small-scale mining: Commonly known as <i>galamsey</i></li> </ul>
<b>Indirect Drivers</b>
<b>Population Growth &amp; Development:</b> <ul style="list-style-type: none"> <li>• Increasing demand for food crops, fuelwood, charcoal, and construction materials</li> </ul>
<b>Low price of timber on domestic market</b>
<b>Global markets</b> <ul style="list-style-type: none"> <li>• Increasing demand for high value timber species.</li> <li>• Growing global demand for chocolate and other cocoa products.</li> <li>• Increasing global and regional demand for palm oil.</li> </ul>
<b>Weak law enforcement</b>
<b>Land and tree tenure regimes that create perverse incentives</b>
<b>Timber industry over-capacity:</b> <ul style="list-style-type: none"> <li>• Proliferation of chainsaws and small-scale mills</li> </ul>

## 2.2 Key interventions to reduce deforestation and degradation

A set of strategic options for addressing the direct and indirect drivers of deforestation and degradation was compiled (Figure 2-2). Each option was assessed based on ten criteria that were grouped according to importance (primary, secondary, tertiary) (Figure 2-3)



Figure 2-2: Ghana's Strategic Options for Addressing Drivers of Deforestation and Degradation (Copyright Ghana Forestry Commission)

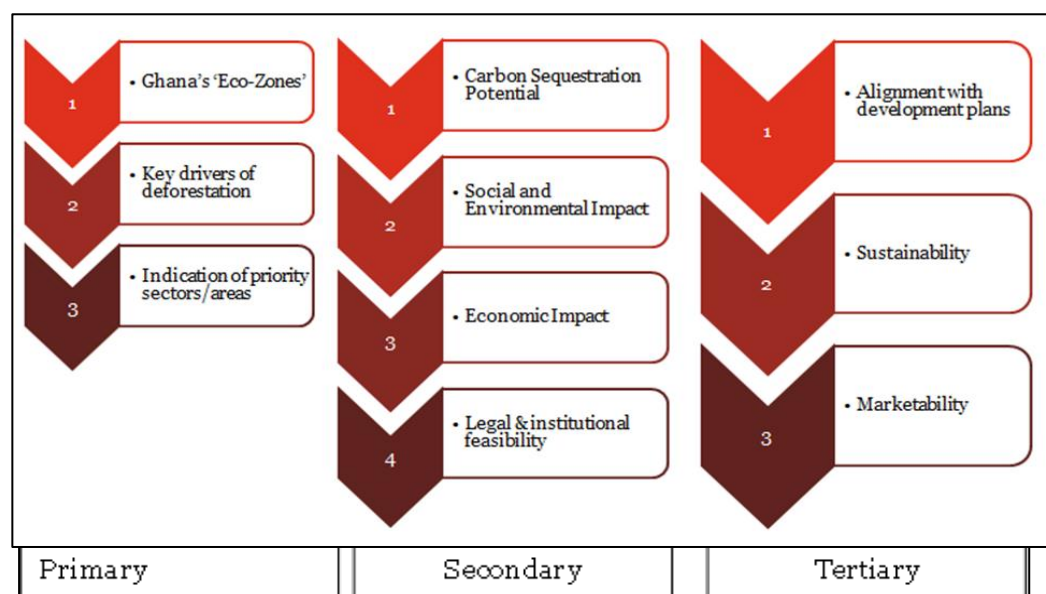


Figure 2-3: Assessment criteria for strategy options

This analysis resulted in the identification of three broad interventions representing a strategic grouping of the various strategy options; the idea being that when they are implemented in concert, they will have the highest potential to significantly impact the direct drivers, which are aligned to specific forest eco-zones, or to address in-direct drivers at a national level. The three recommended interventions and the associated strategy options to reduce deforestation and degradation are laid out in Figure 2-4.

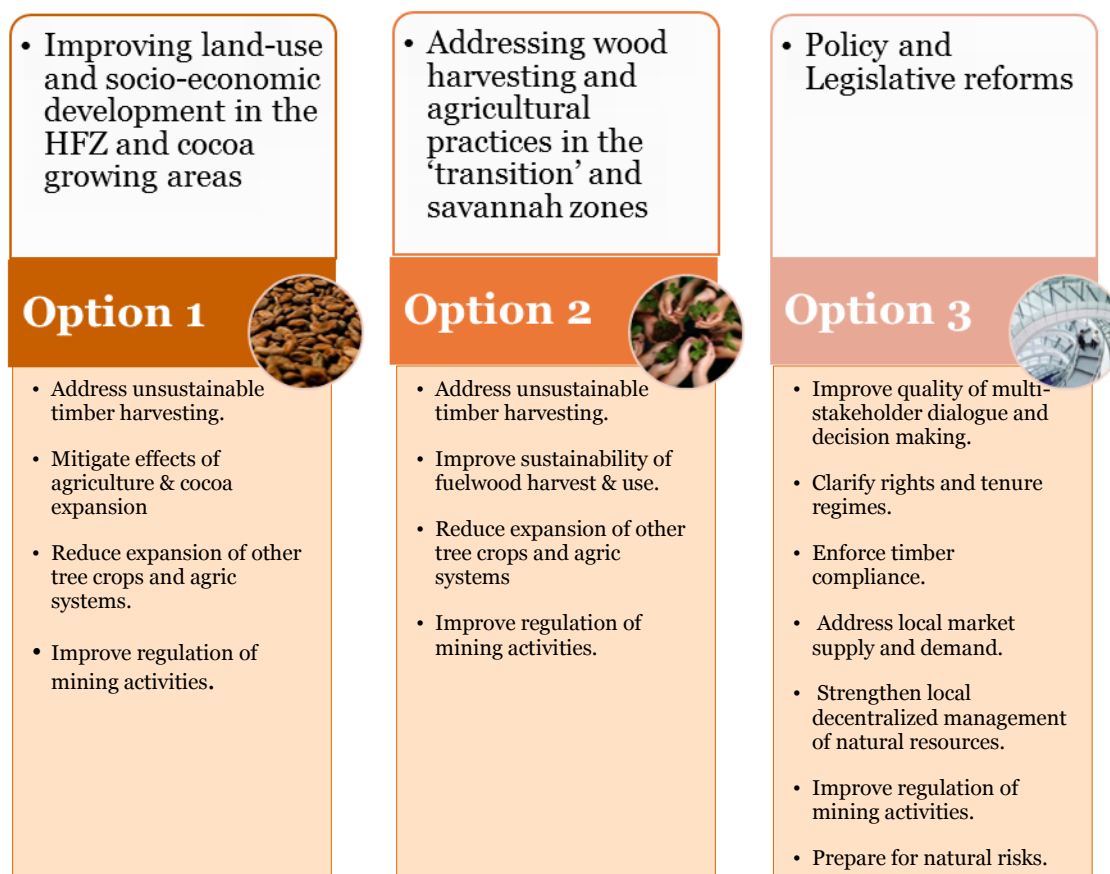


Figure 2-4: Ghana's Strategy Interventions and Options

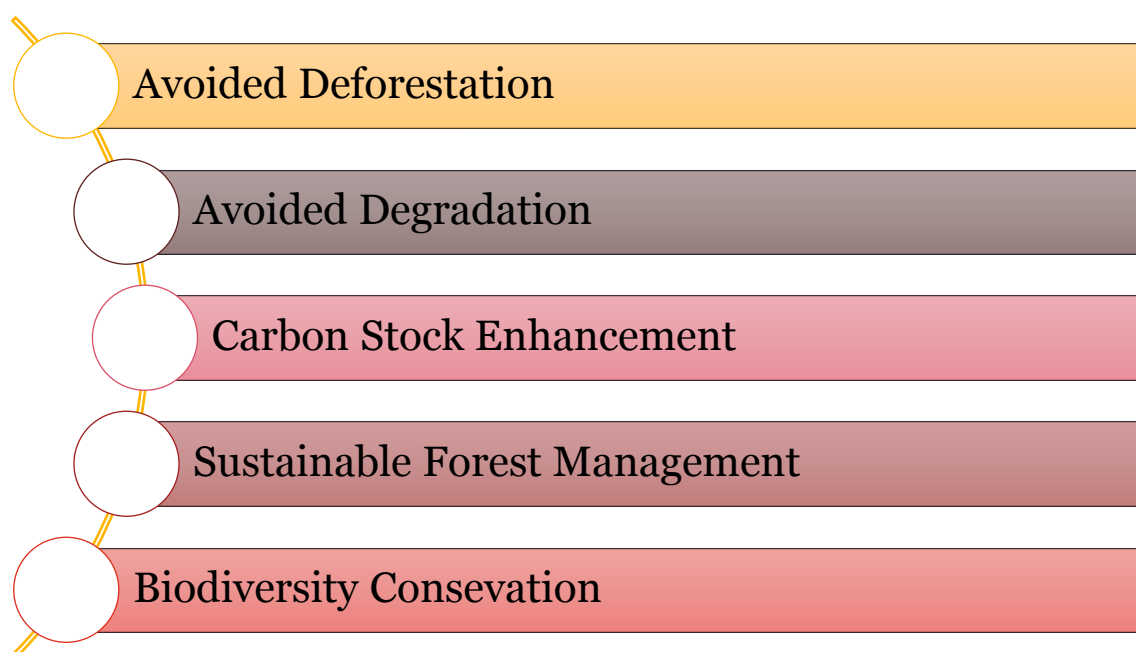
## 2.3 Scope of REDD+

REDD+ contains five main elements, as depicted in Figure 2-5. The concept was introduced for the first time in 2005 at the COP 11 in Montreal, Canada. The original notion of REDD+ focused only on RED—reducing emissions from deforestation. However, over the last decade, it has evolved and expanded in scope to include degradation (REDD) and the Plus which refers to carbon stock enhancement (CSE), sustainable forest management (SFM) and biodiversity conservation.

Ghana will aim to include the full scope of REDD+ elements as part of its NRS, but for these elements to fully work, they need to be implemented in a phased approach, in compliance with approved methodologies for monitoring deforestation (or afforestation) and accounting for emission reductions, sequestration, or other impacts. Therefore, during the initial phase of implementation of the REDD+ mechanism, Ghana's strategy is to focus on Avoided Deforestation (AD), CSE, and biodiversity conservation. In the next few years when Ghana is expected to have attained a full readiness position for REDD+, there should be a functional National Forest Monitoring and MRV system in place to monitor AD and CSE, and methodologies exist for both types of

REDD+ interventions. Methodologies for biodiversity are available under the Climate Community and Biodiversity (CCB) standards.

At this stage, national systems for monitoring and accounting for Avoided Degradation (ADD) or Sustainable Forest Management (SFM) are yet to be fully developed. Therefore in the immediate term, the GNRS will not focus on these types of interventions, but it is likely that by the second phase of implementation when the needed capacity and relevant experiences have been built, they will be pursued as well. The National REDD+ Secretariat is already engaged in discussion with global experts to design a system for ADD, though this will take time, and Ghana's Voluntary Partnership Agreement (VPA-FLEGT) could also be fully operational in the coming years, making it possible to realize SFM as part of the country's REDD+ mechanism.



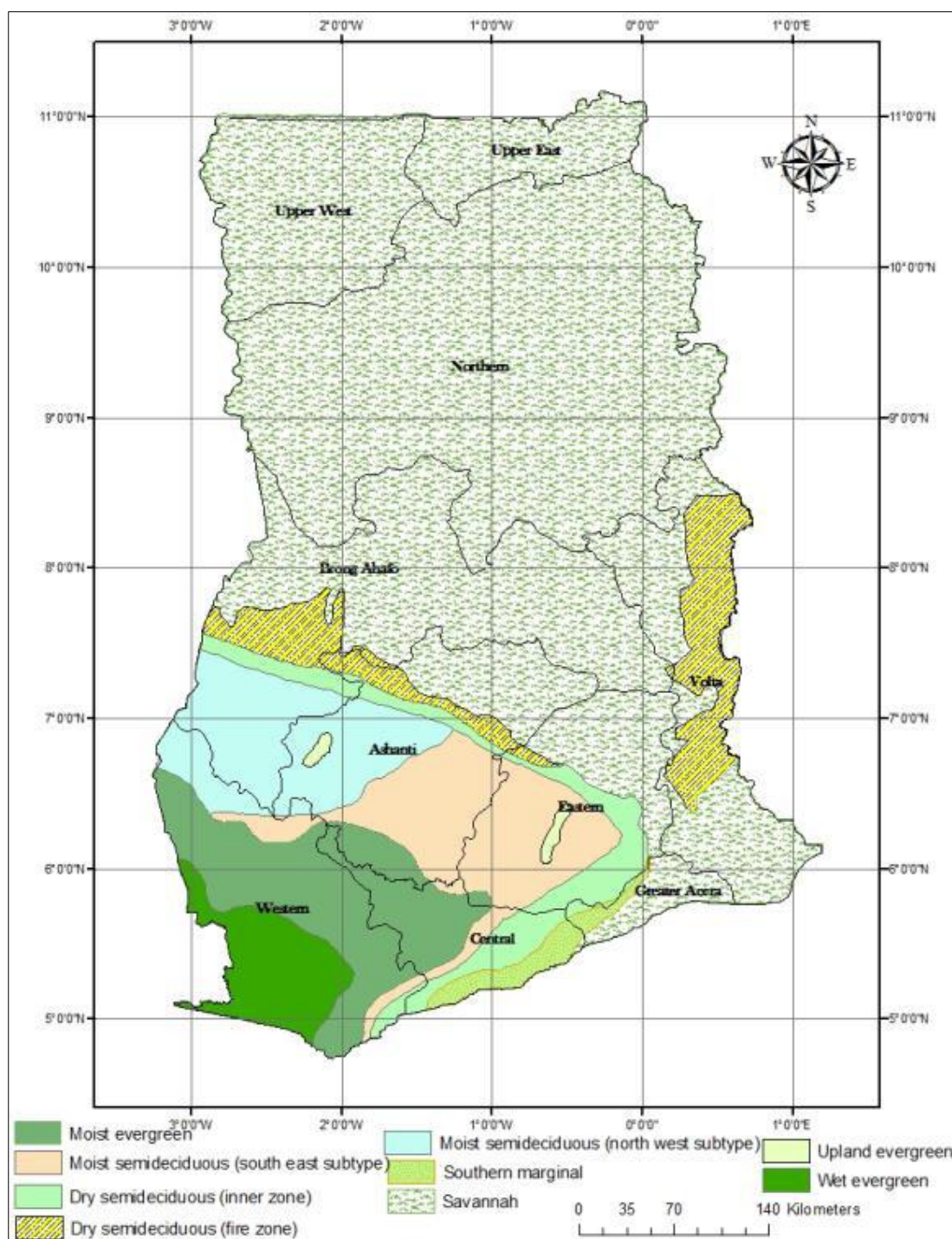
*Figure 2-5: The methodological elements of REDD+*

## 2.4 Forest Definition

Ghana's forest definition in the context of REDD+ is 15% canopy cover, 5 meters tall, and 1 hectare in area, based on thresholds set by the IPCC for these structural parameters and the Marrakesh Accord. Forested areas, forest patches, or assemblages of naturally regenerated tree that have at least 15% canopy cover, with an average height of 5 meters, and cover a minimum area of 1 hectare constitute a forest for the purposes of REDD+ in Ghana. This definition was agreed upon 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+.

The risk of reducing the canopy cover threshold to 10% and the lower height limit to 3 meters is that this could increase deforestation and degradation in the high forest zone (HFZ) and make it increasingly difficult to reduce emissions while also achieving development goals. It may also be argued that the northern savanna zone also has immense potential for afforestation/reforestation (A/R) projects under the Clean Development Mechanism (CDM) and that REDD+ could not possibly be a "one size fits all" mechanism. One key point is that the UNFCCC will accept only a single forest definition for each country, and there is no option to provide different forest definitions for the various ecological zones.

Indufor Oy, the consultant tasked to develop Ghana's MRV system and Reference Emission Level (REL) was requested to evaluate the definition and advice on its appropriateness for Ghana's situation. The recommendation is that the status quo is tenable and this is the position that will be maintained for the time being. Indeed, that report from the consultant states that, "[T]he forest definition for Ghana allows inclusion of savannah woodlands and other vital landscapes such as gallery forest within the savannah environment to be captured, measured and reported as forest."



*Figure 2-6: Ghana's Forest Types and Ecological Zones (Eco-Zones)*

*(Copyright Ghana Forestry Commission)*

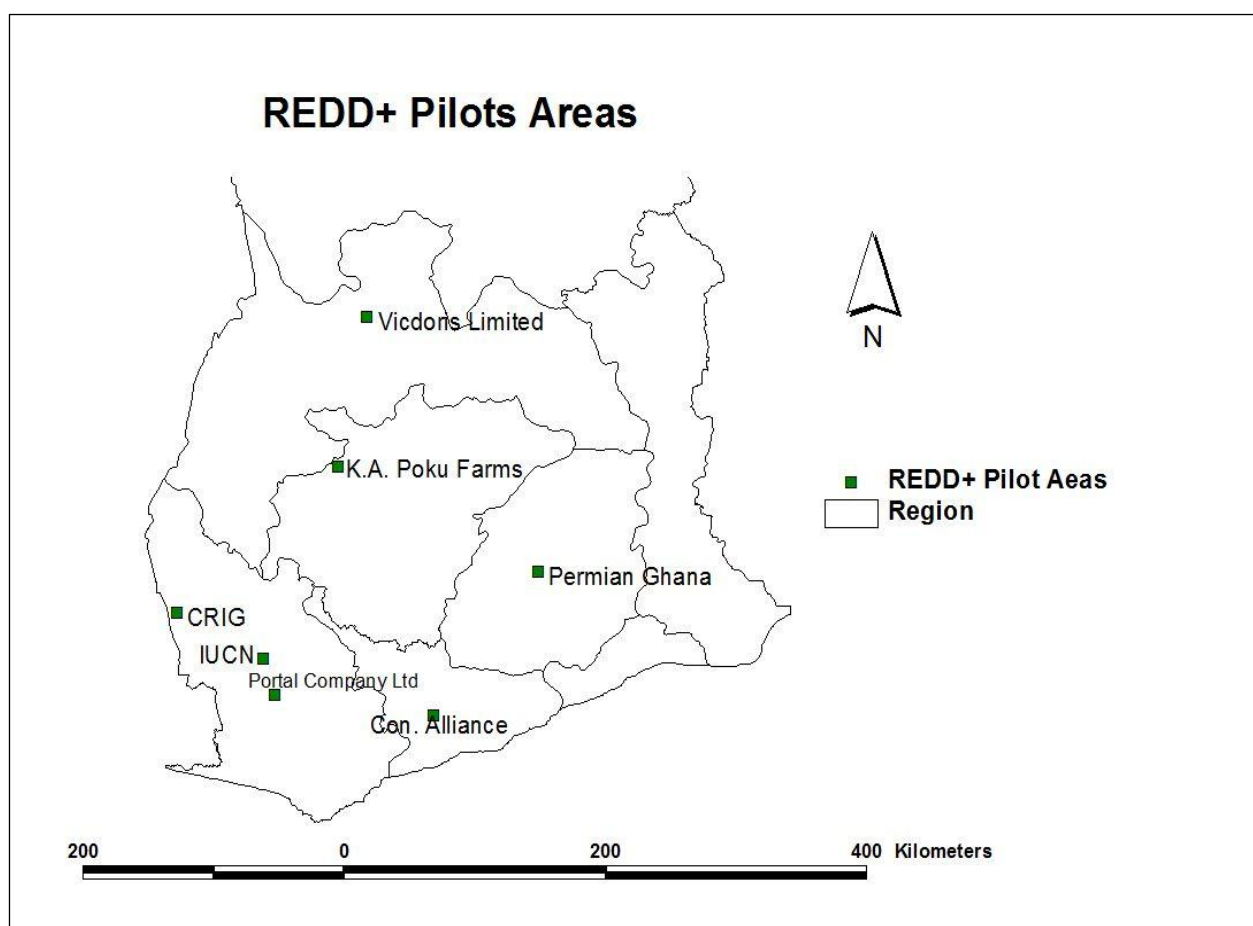


Defining forest not only raises the question of forest structure, but also highlights the question of which types of trees (native vs. exotic; naturally regenerated vs. planted) can constitute forest. So as to stay in line with the vision and goals of this strategy, only naturally regenerated trees and forest systems will be considered as forest. Tree crops, including cocoa, citrus, oil palm (in smallholder or estate plantations), and rubber are not considered to be forest trees.

Plantations, especially native, mixed species plantation raise an interesting question with respect to the forest definition and as part of Ghana's strategy, plantations (taking into consideration their specific management objectives) should be considered so that an appropriate decision can be made and the strategy adapted accordingly.

## 2.5 Implementation Approach

Ghana's R-PP articulated a, "learning from the ground up" approach, and early efforts on REDD+ in Ghana focused on seven small-scale pilots (Figure 2-7) that were meant to test methods and activities and demonstrate key lessons for expansion. The majority of pilots, however, lacked the technical expertise and financial backing to make significant progress.



*Figure 2-7: Ghana's Forest Types and Ecological Zones (Eco-Zones). (Copyright, Ghana Forestry Commission).*

In light of these challenges, and the growing international consensus that large-scale action is needed to produce results, Ghana will adopt a nested approach to implementation. The strategy will focus on the implementation of large scale, sub-national programs, which follow ecological boundaries or eco-zones (Figure 2-6) and are defined by major commodities and drivers of deforestation and degradation, within a set of overarching, national activities and the encompassing national REDD+ framework.

Ghana's national demonstration projects and other pilots will be nested within the main programmatic areas (sub-national programs). Nesting enables smaller-scale projects to benefit from the national or programmatic REL, as well as the national Forest Monitoring and MRV system, and national benefit sharing systems. This nested, sub-national approach alleviates the challenge of permanence and leakage in the program area that would otherwise have been present and can create problems for smaller projects. It will also reduce the cost and technical capacity required to establish and monitor baselines. Instead, the sub-national program areas will use a "cookie cutter" approach to allocating a proportion of emission reductions to each project. In the instance that pilots develop in advance of programs, "grandfathering" agreements will have to be reached to bring the individual pilot into compliance with the program's Forest Reference Level (FRL).

Through extensive stakeholder consultations dating back to the R-PP formulation stages and the analysis of strategic options for Ghana's NRS, three (3) national and sub-national REDD+ programs have emerged as being the main areas of focus for the coming five-plus years of REDD+ implementation:

- **Strategic Intervention 1:** Improving Land-use and socio-economic development in the High Forest Zone and cocoa growing areas
  - *Title:* Ghana's Emission Reductions Program for the Cocoa Forest Mosaic Landscape (Cocoa Forest REDD+ Program)
  - *Nesting Level:* Sub-national
  - *Eco-Zone:* High Forest Zone
  - *Commodity Focus:* Cocoa, oil palm and other tree crops
  - *Drivers:* Cocoa, other tree crops, Galamsey, Illegal logging
- **Strategic Intervention 2:** Addressing wood harvesting and agricultural practices in the 'transition' and savannah zone.
  - *Title:* Emission Reductions Program for the Shea Landscape of the Northern Savanna Woodland (Shea Savanna Woodland REDD+ Program);
  - *Nesting Level:* Sub-national
  - *Eco-Zone:* Savanna Woodland Zone
  - *Commodity Focus:* Shea (scientific name) and possibly Cashew
  - *Drivers:* Charcoal, illegal logging, agricultural expansion
- **Strategic Intervention 3:** Policy and legislative reforms to support REDD+ and a sustainable Forestry sector.
  - *Nesting Level:* National
  - *Focus:* Addressing indirect drivers
  - *Leverages:* National level interventions will leverage the funding and activities being implemented under the VPA-FLEGT process and eventual implementation as well as the projects under Ghana's FIP.

Potential programmatic areas or landscapes that require further investigation for future implementation:

- Mangrove Eco-Zone Emission Reduction Program:
  - Despite the fact that mangroves are a highly threatened natural forest ecosystem along Ghana's coasts and inland waterways, to date they have not been the focus of any serious national REDD+ consideration, though USAID/USFS have been supporting work in this area for a number of years. The lack of national attention appears to be a critical oversight. Recent works in Ghana suggests that approximately 2,000 Mg/ha are stored in the mangrove system, one hundred fold more than in tropical high forests. The magnitude of carbon stocks coupled with the existing threat to these unique and environmentally important forest types creates a strong imperative that for REDD+ action.
- “Togo Plateau” and the dry demi-deciduous forests zone:
  - Along Ghana's mid-eastern border with Togo, there is an area of Volta Region, commonly referred to as the Togo Plateau, which contains some of the highest carbon stocks in the country due to a mosaic of protected forests, off-reserve forest patches, high biomass cocoa farms and other complex agroforestry systems. It is also an area that is rich in biodiversity. Yet this landscape has received the least attention of all possible REDD+ interventions. Resources should be allocated to explore the potential for REDD+ interventions in this stretch of the Volta Region, either as a sub-national approach or at the project-level scale.

If portions of the country are not covered by a sub-national program, then REDD+ projects could be implemented and nested within the national level, without fitting within a sub-national, programmatic landscape.

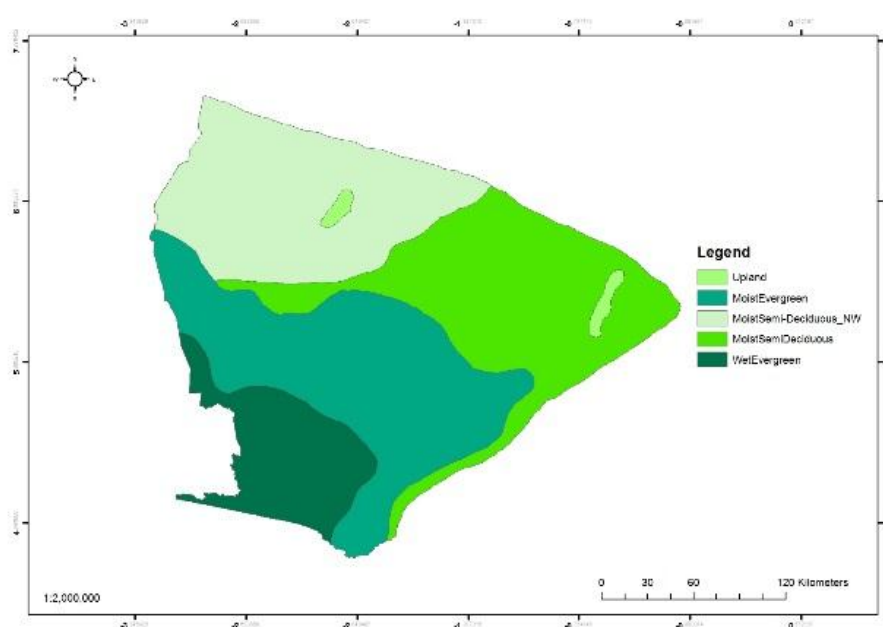
### ***2.5.1 Emission Reductions Program for the Cocoa Forest Mosaic Landscape***

In April, 2014, Ghana's Emission Reductions Program for the Cocoa Forest Mosaic Landscape was formally accepted into the World Bank's Carbon Fund pipeline, opening up the possibility for Ghana to sign an Emission Reductions Purchase Agreement (ERPA) worth up to US\$ 50 million.

This program represents an innovative, unique, and highly ambitious approach to reduce deforestation and degradation in a sub-national landscape that follows the ecological boundaries of the HFZ and covers approximately 5.9 million ha (Figure 2-8). The program seeks to significantly reduce emissions driven by cocoa farming and other agricultural drivers, as well as illegal logging and illegal mining, in a manner that will secure the future of Ghana's forests, significantly improve incomes and livelihood opportunities for farmers and forest users, and establish a results-based planning and implementation framework through which the government, the private sector, civil society, traditional authorities, and local communities can collaborate towards this goal.

Ghana's ER Program conservatively anticipates that it will produce **18.5 MtCO<sub>2</sub>e of emission reductions from deforestation in the first 5 years (2016-2020) of the program.** Given the effort required to implement a landscape scale, cross sector, inter-governmental, multi-stakeholder, results based program, and acknowledging that fostering changes in how people use the land and manage trees takes time; Ghana recognizes that this represents a highly ambitious target, but one that must be pursued. Ghana would expect the Carbon Fund to purchase the full magnitude of emission reductions (ERs) produced up to 2020, with other buyers to follow-suit. As the program's performance effectiveness improves in the ensuing years (2021-2036), the program expects its net emission reductions from deforestation to total 216.7 MtCO<sub>2</sub>e, assuming 45% effectiveness and minus a 15% buffer allocation.





*Figure 2-8: Location of the Emission Reductions Program for the Cocoa Forest Mosaic Landscape (Copyright Ghana Forestry Commission).*

If no effort is made to curb deforestation in the program area, then Ghana expects the business-as-usual scenario to carry forward and produce at least 598.2 MtCO<sub>2</sub>e of emission from deforestation, based on a 10 year historical deforestation rate (2000-2010) of 1.4% per annum.

Ghana's Forestry Commission and Cocoa Board are the main government institutions that will be responsible for managing and implementing Ghana's "Cocoa Forest REDD Program", in concert with the Ministry of Lands & Natural Resources (which is responsible for the Forest Investment Program (FIP)), and private sector stakeholders, who will provide critical upfront engagement and investment. Together, they will establish a program Steering Committee, comprised of key stakeholders that will be responsible for the design, management, investment and implementation of the program. The Steering Committee will be linked to the National REDD+ Steering Committee and will liaise directly with the NREG program.

## **2.5.2 Emission Reductions Program for the Shea Landscape of the Northern Savanna Woodland**

A programmatic REDD+ initiative targeting the Shea landscapes of the north could be designed for promoting sustainable approaches to land use and enhanced resource governance to stem the on-going degradation and deforestation. This program would also be an important initiative to strengthen rural economies in the north and address poverty, which is widely considered to be endemic in this zone.

This program has not benefitted from years of data collection, conceptualization, and planning; thus considerable work will be required to fully understand the land use and land use change dynamics in the landscape and the most viable REDD+ activities. It is recommended that resources are mobilized or sought in the short term to support studies and analysis that can inform full scale development in the medium term (3-5 years).

This forest eco-zone which covers vast swathes of Ghana's landmass (over 60%) is fast losing its preponderance of forests, highly valuable savanna woodland species (including rosewood and shea trees) and wildlife due to destructive charcoal production, illegal logging, farming practices, illegal mining, hunting, livestock grazing,

and human induced fires. The Northern Savanna Woodland landscape is an important source of several Ghanaian staples, including root tubers like yam, cereals such as millets, assorted vegetables and nuts, and with its large tracts of grasslands, it hosts most of Ghana's livestock population, helping in a major way to meet the protein needs of the country. Of considerable concern is that the area is highly susceptible to climate change, which further magnifies the poverty and natural resource degradation.

Various commodities of global interest that come from the area include shea butter and rosewood. Shea trees (*Vitellaria paradoxa*) occur naturally in the landscape and are harvested by women to produce shea butter, a product that is used and consumed locally, nationally and globally. However Shea trees are being lost to indiscriminate charcoaling driven by a burgeoning urban demand. African Rosewood is a CITES listed endangered species that is of highly sought after in China and is being illegally harvested and exported. Addressing the threats to these species, as well as the other drivers and sustainable development challenges will require robust policy responses coupled with well thought out activities. These could include sustainable woodfuel and charcoal supply initiatives, promotion of climate-smart agriculture and agroforestry systems, tree planting and native species plantations and woodlots, landscape level land use planning, developing a Shea landscape standard of certification, wildfire management efforts.

## 2.6 Time Frame and Phases

**Phase I: Preparation and Design Phase (2008-2015):** Ghana will complete its REDD Readiness Preparation and submit its R-Package in late 2015 for international approval. During 2015, the ERP will undergo a preparation and design phase to refine the rates of deforestation and degradation, particular hot-spots of drivers, and to better inform the FRL. This phase would also allow for in-depth stakeholder planning, a thorough consultation process, and fundraising. The program would then submit its ER-PD at the end of 2015 with the goal of signing an Emission Reductions Program Agreement (ERPA) in early 2016.

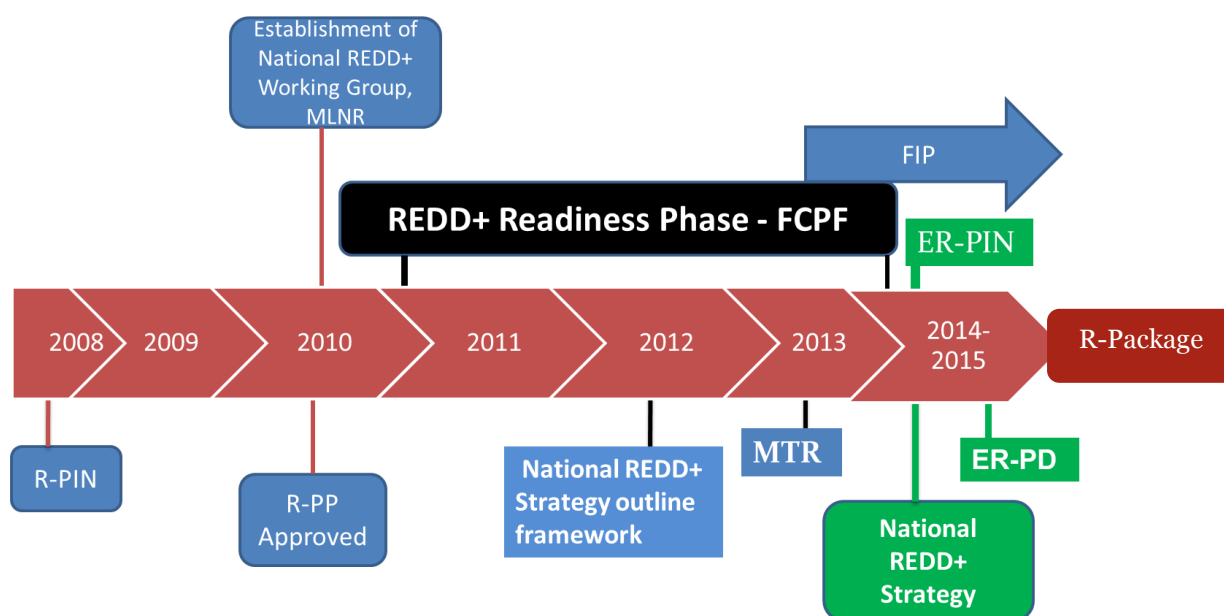


Figure 2-9: REDD+ Strategy Phase I: Preparation and Design, R-PP, 2010

**Phase II: Early Implementation, Monitoring, Performance Based Payments, Scaling Up (2016-2030):** The second phase of REDD+ will focus on implementing the Cocoa Forest REDD+ Program and associated activities with an initial monitoring is proposed for 2018, followed by a second monitoring of ERs against the REL in 2020. Assuming that the monitoring activities demonstrate strong performance, two payments would be made for emissions reductions generated during the time period from the Carbon Fund. Carrying forward from 2020, forest monitoring and emissions reductions payments will continue to occur every

4 years (as Ghana has indicated in its National Communication to the UNFCCC), assuming that fund-based, bilateral or private sector buyers are committed. These payments will be conditional upon the continued implementation and scaling up of the Cocoa Program and other programs (e.g. Shea Landscape) and REDD+ activities.

**Phase III: Performance Based Payments, Consolidation, Determining Future of REDD+ (2021-2036):** Phase 3 marks the end of the Cocoa Forest REDD+ Program, as currently articulated. During this phase, final payments will be received assuming performance is demonstrated. Ghana's REDD+ Strategy will need to be assessed and the way forward determined. As the program becomes more efficient at reducing deforestation and degradation and planted trees accumulate more carbon stores, the magnitude of E.Rs is expected to increase.

## 2.7 Financing REDD+

Financing REDD+ remains a significant obstacle for REDD+ in Ghana. Though Ghana has received sufficient support for its REDD+ Readiness project (US\$ 3.4 million), which aims to build capacity and understanding, conduct analyses, and develop the mechanisms and structures to support the implementation of REDD+, no readiness funding could be used to support the national REDD+ demonstration pilots. In fact, from 2009 through 2013, US\$117,963,055 was committed to support REDD+ in Ghana, but only US\$18,848,158 was disbursed by the donors and intermediary institutions to twenty-three (23) in-country recipients. This represents a 16% disbursement rate against committed funds over the five year period. Further, of the funds received, money spent has primarily focused on stakeholder engagement, institutional strengthening, and improved forest and land management. To date, no project or activity has come close to producing verifiable emissions reductions (Agyei & Asare, 2014).

For Ghana to be realistic about achieving REDD+, its financing strategy follows a “bird in the hand” approach, with an aim to maximize existing sources of finance and leveraging synergistic initiatives. Currently, the majority of available financing applies to national level efforts or to the Cocoa Forest REDD+ Program—hence the prioritization of these areas. As additional funds become available, the geographic scope will broaden.

The main steps in REDD+ that require financing are:

- 1) readiness preparation,
- 2) implementation of activities on the ground, and
- 3) payments for emissions reductions. The status of available funding is depicted in Figure 2-10, and described below.

**Readiness Preparation Funding:** Ghana's grant from the FCPF supports all aspects of preparation with the exception of piloting. This financing has been in place since 2012 and will likely carry forward to 2016 due to additional readiness funds that were recently approved.

**ERPD Preparation Funding:** Funding to support full-scale development of Ghana's Emission Reductions Program for the Cocoa Forest Mosaic Landscape has been agreed and will become available to be spent in 2015.

**Implementation:** Funding to support the actual roll out of activities and projects to impact the drivers of deforestation and produce emission reductions is a limiting factor to achieving REDD+. As of now, the only available implementation funds come through Ghana's Forest Investment Program (FIP), which will invest US\$ 50 million into forestry, climate-smart agriculture, and CREMA related projects. Therefore the goal is to leverage this financing to help achieve Ghana's REDD+ goals. The FIP funds are limited to activities in the Western Region and the Brong-Ahafo Region, which only partially align with the REDD+ implementation strategy (initial focus on the ERP). Therefore, while this funding is likely to complement REDD+, it is not a substitute for specific REDD+ activities focused on the ERP landscape.

Funding will also be leverage from the VPA-FLEGT initiative to support sustainable forest management and governance in forest reserves across the country. This financing is particularly important in addressing the lack of enforcement of forest laws and regulations.

It is anticipated that the private sector and bilateral partners will need to support early implementation of Ghana's Cocoa Forest REDD+ Program. Once the program is able to sell emission reductions, then it will have a greater capacity for continued implementation. Financing will also be required to support the development and early implementation of the second ERP.

**Payments:** Having been accepted into the Carbon Fund pipeline of emission reductions programs, Ghana is very well positioned to receive up to US\$ 50 million in exchange for reducing deforestation across the Cocoa Forest REDD+ program area. Ghana would expect the Carbon Fund to purchase the full magnitude of emission reductions (ERs) produced across the landscape up to 2020, beyond which other buyers would follow-suit. Though yet to be internationally agreed, the Green Fund is one option. The private sector or bilateral agreements are other options.

It is expected that under a post-2020 international climate treaty, there will be a surge in demand for carbon credits / emission reductions attended by a corresponding increase in the price of carbon as an ecosystem commodity. Such a situation could spur significant interest in emission reduction programs and projects in the medium to long-term, serving as a stimulus for private sector investments in this emerging market.

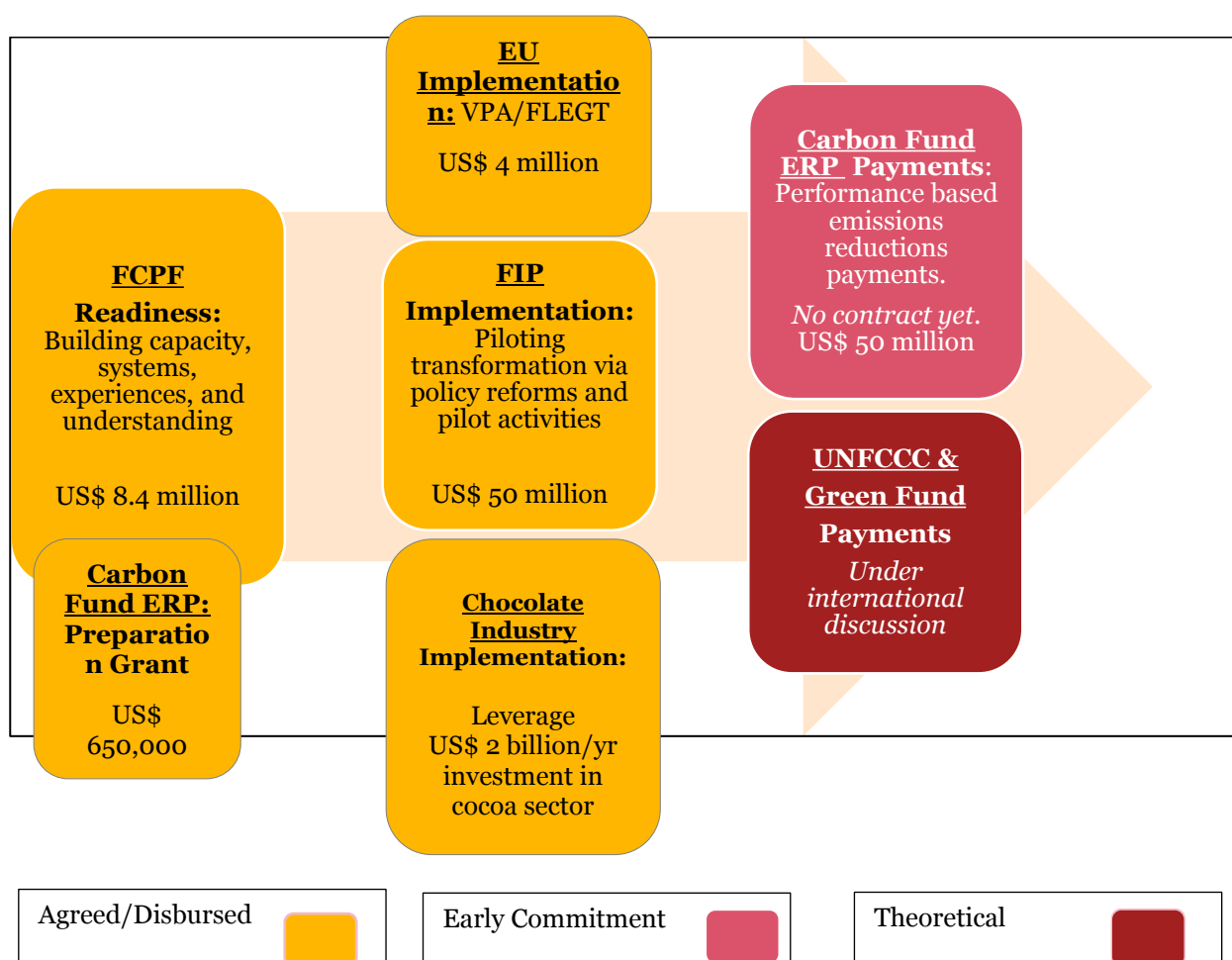


Figure 2-10: Ghana's REDD+ Financing Strategy for Preparation, Implementation and Payments, Copyright Asare, 2014

## 3. REDD+ Governance

### 3.1 Overview

There has been over-exploitation of timber and wildlife resources with the official Annual Allowable Cut (2 million m<sup>3</sup>) being consistently exceeded by over 1.7 million m<sup>3</sup> annually for more than a decade (Hansen et al. 2011; Marfo 2010). Reducing forest degradation and deforestation and ensuring sustainable management of Ghana's forest resources will happen under a regime of good forest governance. In terms of policy, the 2012 Forest and Wildlife policy set out clear goals for sustainability and map out strategies that when implemented effectively should enhance the achievement of reducing deforestation and forest degradation. The forestry sector has a hierarchical institutional setup from Ministerial level to district-level forest service agencies that develop and promote policies. The Forestry Commission and its Divisions is not decentralized, in the sense of devolution of authority, as it continues to have centralized control systems over planning and resource allocation. Coordination within institutional and among sectorial programmes is a key governance issue in the sector. With the emerging complexity of the environmental services functions of the forest and the increasing number of initiatives to address particular aspects, there is a greater need for synergies and coordination. For example, even though Forest Law Enforcement Governance Trade (FLEGT), Voluntary Partnership Agreement (VPA) and REDD+ must play complimentary roles, they are in many ways being implemented without an effective coordination and synergy (Marfo, et al, 2013).

For the past two decades, collaborative forest management has been promoted, increasing the participation of stakeholders, particularly local communities and civil society groups in forest management and policy processes. At the community level, the Collaborative Resource Management Committees (CRMCs) have emerged and to a large extent institutionalized. Increasingly multi-stakeholder dialogue and consultation process is being institutionalized. Particularly, the ongoing efforts to harmonize different multi stakeholder dialogue processes and institutionalize them will enhance the democratization of the forestry sector. The Forest Forum is maturing and gaining recognition as a credible consultation platform across the district, regional and national scales of forest decision making body. Even though the constitution and forest sector policies, particularly those of the 1994 and 2014 espouses democratic ideals of providing space for stakeholder consultation and participation, and indeed many recent initiatives like the FLEGT-VPA negotiation and the REDD+ readiness consultation processes used this, there is the need to strengthen the responsiveness and accountability of stakeholder representatives. In effect, democratic representation remains a challenge in the sector.

The forestry sector is also characterized by conflicts, particularly those related to tree tenure, benefit sharing or distribution especially related to compensation payments and Social Responsibility Agreement benefits and land boundaries. Litigation in the courts and mediation remain the main dispute resolution options, though formal dispute settlement procedures are generally lacking within the forest service. This is a critical context for the implementation of REDD+ as questions of carbon rights, tree tenure rights and beneficiary rights remain largely unanswered.

Law enforcement, transparency and accountability are important issues. Generally, law enforcement in the forestry sector is weak, particularly related to curbing illegal logging and chainsaw milling and trade. There is an improvement in the transparency of benefit sharing and information availability to the general public, especially through the website and the introduction of customer service officers at the district offices of the Forestry Commission. Accountability issues related to forest management cost incurred by the Forestry Commission and the use of forest benefits by District Assemblies and Traditional Authorities remain weak. Recent studies of the sector suggest that, generally, the status of the adequacy of laws and regulations, institutional arrangements and stakeholder consultation in the sector were judged to be sufficient but needs improvement. Even though the status of laws and regulations governing the sector was considered sufficient, there are still significant gaps with respect to regulation regime for off-reserve management.

Governing the domestic trade of timber to comply with existing laws is problematic as over 80% of lumber is illegal (Marfo, 2010). The domestic demand for timber, complicated by high volumes of overland export to neighboring Sahelian regions (estimated at about 260,000m<sup>3</sup> per annum), is a major driver of deforestation (Marfo et al. 2014). While successive policies and legislations have not been able to address the problem of illegal supply of timber to the domestic market, the 2012 Forest and Wildlife Policy (FWP) introduces artisanal milling concept. For it to be successful at addressing illegal chainsaw operations and halt its threat to REDD+ interventions, raw material allocation to artisanal millers and conventional saw millers against the backdrop of the sustainable yield allocation, increased enforcement of the chainsaw ban and the effective operationalization of the artisanal milling concept still remains to be addressed. The details of implementation require some technical analysis as well as sustained stakeholder dialogue and consensus building.

## **3.2 Policy environment, legal and institutional framework**

### **3.2.1 National Development Policy**

The development agenda of Ghana is underpinned by the objectives of the Ghana Poverty Reduction Strategy (GPRS) and the attainment of the Millennium Development Goals (MDGs).

The Ghana's Shared Growth and Development Agenda two (GSGDA) has three distinct pillars: private sector competitiveness, human resource development, and good governance with civic responsibility. Implicit in the narratives of the growth agenda is the need for the forestry sector to:

- Achieve sustainable forest management and reducing deforestation and forest degradation and so developing a stable timber resource for Ghana's future.
- Increase value addition in the timber processing industry to create jobs with manufacturing skills.
- Increase rural employment and livelihoods through local management of off-reserve forests, through mechanisms such as dedicated forests or Community Resource Management Areas (CREMAs).
- Support investments in plantation timber, tertiary processing, eco-tourism, and wildlife facilities.
- Fully capture economic and financial rents to ensure an effective regulator and a broader tax base.

### **3.2.2 Forest Policy**

The 2012 Forest and Wildlife Policy is the parent sector policy aimed at the conservation and sustainable development of forest and wildlife resources for the maintenance of environmental stability and continuous flow of optimum benefits from the social-cultural and economic goods and services to the present and future generations, whilst fulfilling Ghana's commitments under international agreements and conventions. Specifically, the policy objectives to be pursued and which should drive the implementation and coordination of emerging interventions like VPA and REDD+ are:

1. To manage and enhance the ecological integrity of Ghana's forest, savannah, wetlands and other ecosystems for the preservation of vital soil and water resources, conservation of biological diversity, enhancing carbon stocks for sustainable production of domestic and commercial produce.
2. To promote the rehabilitation and restoration of degraded landscapes through plantations development and community forestry informed by appropriate land-use practices to enhance environmental quality and sustain the supply of raw materials for domestic and industrial consumption and for environmental protection.
3. To promote the development of viable forest and wildlife based industries and livelihoods, particularly in the value added processing of forest and wildlife resources that satisfy domestic and international demand for competitively priced quality products.
4. To promote and develop mechanisms for transparent governance, equity sharing and citizens' participation in forest and wildlife resource management.
5. To promote training, research and technology development that supports sustainable forest management whilst promoting information uptake both by forestry institutions and the general public.



### 3.2.3 Land policy

The Land Policy of Ghana aims at the judicious use of the nation's land and all its natural resources by all sections of the Ghanaian society in support of various socio- economic activities undertaken in accordance with sustainable resource management principles and in maintaining viable ecosystems. The policy enunciates specific actions that are relevant to the implementation of REDD+. For example, it states that decision-making with respect to disposal of land should take into consideration the natural resources of the land; conservation of land for future generation; protection of land rights of the present generation; accountability to the subjects for whom the land is held in trust, in 123) and in accordance with the provisions of the Administration of Lands Act, 1962 (Act 123) and the Head of Family Accountability Law, 1985 (P.N.D.C.L. 112).

### 3.2.4 Wildfire policy

Wildfire is a major driver of deforestation and forest degradation and needs to be tackled in any intervention. Fortunately, Ghana has a comprehensive National Wildfire Policy that outlines strategic actions to manage wild fire in forest areas. The Policy seeks to promote effective and efficient management of wildfires for the sustainable management of natural resources and maintenance of environmental quality to improve on the socio-economic well- being of the citizenry. The objectives of the Wildfire Management Policy are to ensure effective and efficient prevention and control of wildfires, the adoption of alternative resource management systems that will minimize the occurrence of Wildfires, develop the necessary structures and systems which will ensure stakeholder participation in wildfire management and, to promote user-focused research in wildfire management. Actions that will help achieve these objectives will be pursued under REDD+ intervention.

### 3.2.5 Legal framework

A number of legal instruments espouse legislative principles that could shape the implementation of REDD+. First, the 1992 Republican Constitution of Ghana, articulate, in Article 36(9), that “the State shall take appropriate measures needed to protect and safeguard the national environment for posterity; and shall seek co-operation with other states and bodies for purposes of protecting the wider international environment for mankind.” It also makes provisions for the setting up of key institutions such as a Lands Commission, an Office of the Administrator of Stools Lands, a Minerals Commission, a Forestry Commission, a Fisheries Commission and such other commissions as the Parliament of Ghana may determine, to be responsible for the regulation and management of the utilization of the natural resources concerned and the coordination of the policies in relation to them.

A number of specific international laws and domestic legislations exist to guide various aspects of interventions that REDD+ may undertake. Key international principles and laws that Ghana has signed to are:

- The 1992 United Nations Conference on Environment and Development (UNCED) Agenda 21,
- the United Nations Framework Convention on climate Change (UNFCCC)
- The International Tropical Timber Agreement 2006, entered into force in December 2011
- The Convention on Biological Diversity (CBD)

In addition to these, there are also a number of key domestic laws that will govern REDD+. They include:

- The Forest Ordinance, 1927 (CAP 157)
- The Forest Protection Act, 1974 (NRCD 243)
- The Trees and Timber Act, 1974 (NRCD 273)
- The Control and Prevention of Bushfires Act, 1990 (PNDCL 229)
- Timber Resource Management Act , 1998 (ACT 547)

- Timber Resource Management Regulations 1998 (LI. 1649)
- Timber Resources Management (Legality Licensing) Regulations, 2012 (LI. 2184)
- The Forest Plantation Development Fund Act 2000 (Act 583)
- Administration of Lands Act, 1962 (Act 123)
- Local Government Act, 1993 (Act 462)

In summary, these laws provide legal basis for the establishment of forest reserves, procedures and conditions for the allocation of timber and other rights, regulate the establishment of plantations, lay out benefit sharing arrangements, spell out forest offences and provide guidelines for the management and development of forest and wildlife resources, including institutional mandates and responsibilities.

### 3.3 Institutional framework

The institutional framework designed for implementing REDD+ evolved through an extensive stakeholder consultation during the readiness plan phase. The hierarchical architecture from the executive level of government through statutory agencies to local level multi-stakeholder consultation platform allows for vertical and horizontal coordination to implement REDD+ actions. The institutional arrangement is complex demanding intra and inter-sectorial coordination and extensive consultation with civil society and technical subject experts. The Climate Change Unit remains a fulcrum around which most of these actions can take place and hence its capacity to manage a complex programme like REDD+ must be kept in balance.

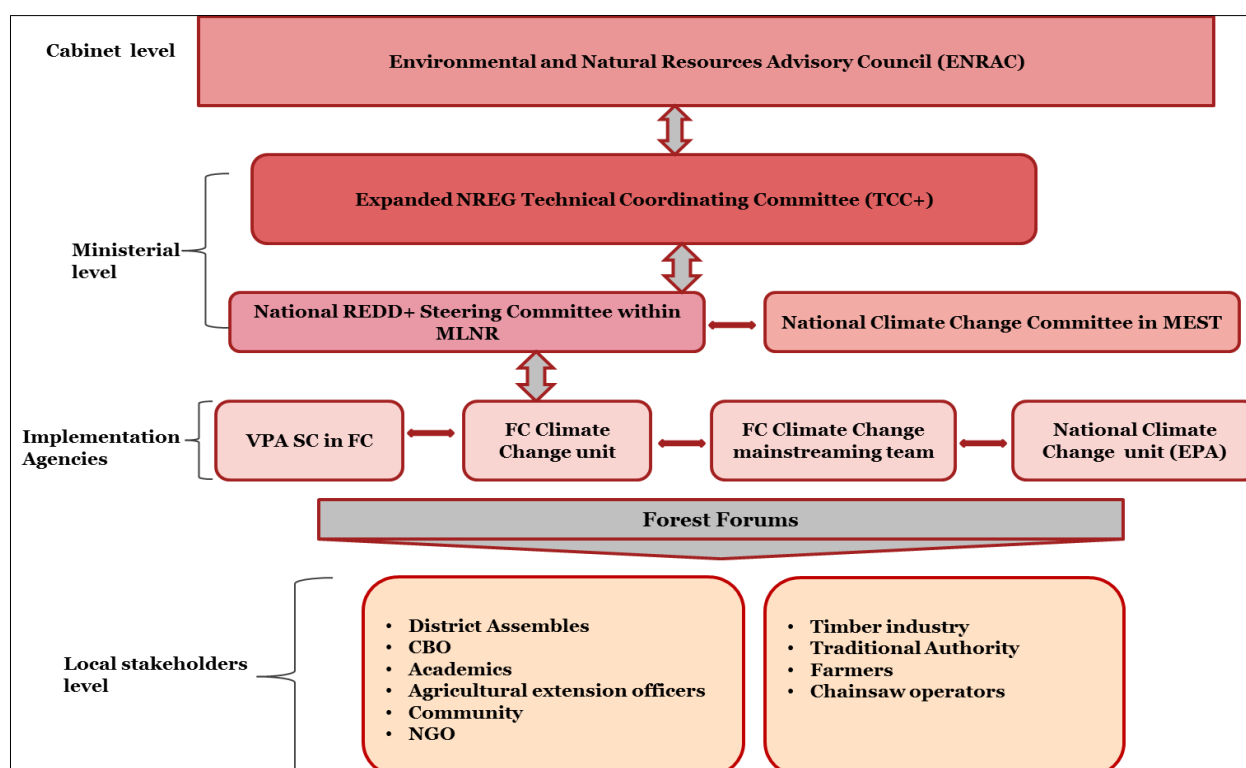


Figure 3-1: The institutional arrangement for governing REDD+ in Ghana, R-PP, 2010



### **3.3.1 Strategic partners for the implementation of REDD+**

### **3.3.2 The Forestry Commission**

The Forestry Commission (FC) has a statutory mandate to manage and develop the forest resources of Ghana. This places the Commission at the center of the design and implementation of Ghana's REDD+ programme. Subsequently, building the capacity of its climate change unit in areas like monitoring and evaluation is of strategic importance to the effective coordination of the REDD+ programme. The advisory role on policy formulation and relationship with the MLNR should enable it to bring technical insights into policy decisions that will affect REDD+ implementation. The coordination between the Commission and the Ministry of Land and Natural Resources (MLNR) in this respect will therefore be strengthened using the REDD Steering Committee. Moreover, REDD+ should benefit from the various collaborative structures that the FC has already established from community-national levels, particularly, the CRMCs, the Forest Forum and the multi-stakeholder technical working groups.

### **3.3.3 Ministry of Lands and Natural Resources and Others**

The MLNR has ministerial responsibility towards the development and monitoring of sound policies to ensure the sustainable management and development of Ghana's land and natural resources including forests. The Ministry has key Commissions whose areas of operations are strategic to REDD+. In addition to the FC, they include the Minerals and Land Commissions.

The Minerals Commission was established by the Minerals Commission Act, 1993 (Act 450) is under the Ministerial jurisdiction of the Ministry of Lands and Natural Resources. The Commission is responsible for the regulation and management of the utilisation of mineral resources and the co-ordination of the policies in relation to them. As part of Ghana's REDD plus strategies to reduce forest degradation and afforestation, improving the regulation of mining activities to reduce forest degradation is important. Collaborating with the Commission will ensure that the administration of minerals rights and regulation of mining activities in forest areas, especially illegal small-scale mining popularly known as 'galamsay' which has overwhelmed the Commission, is strengthened. Through the Natural Resources and Environmental Governance Programme (NREG) of the Forestry Commission, this collaboration will be strengthened.

In order to leverage these strategic commissions into the implementation of the REDD+ programme, efforts to coordinate and build positive synergies among these commissions will be key. Therefore, the representation of the MLNR in the various committees governing the REDD+ process should be coordinated to ensure responsiveness and accountability. Hence, an internal coordination mechanism that allows various representatives to consult extensively within the Ministry and provide feedback must be in place.

At the same time, inter-sectorial coordination between the MLNR and other key ministries like the Ministry of Environment, Science, Technology and Innovation (MESTI), the Ministry of Food and Agriculture (MOFA) and the Ministry of Energy (MOE). MESTI plays an important role in national Climate Change agenda development and has been the leading ministry in negotiations as well as reporting to UNFCCC. It is recommended that more solid governance structures are developed to streamline communication between REDD+ and broader climate change agenda setting. MOFA becomes a key partner as Ghana's deforestation in particular is closely linked to agricultural expansion. Therefore, efforts to develop an agro-practice that is resilient to climate change can be facilitated by MOFA. Moreover, REDD+ implementation should leverage on the extensive geographical network of the Ministry to support the implementation of REDD+ interventions on the ground. Fuelwood is a major source of energy and its exploitation as a driving force of deforestation and degradation. As a ministry with a core mandate on securing sustainable energy, the MOE is needed for REDD+ both in terms of assisting to providing complementary policies and implementing REDD interventions on the ground.

Within the context of collaboration of these key ministries, instituting and strengthening, again the responsiveness and accountability of their respective representatives is fundamental to the design and implementation of an effective REDD+ interventions.

### **3.3.4 Research and other regulatory agencies**

Outside these Ministries and their commissions, the research institutions are also of immense strategic importance to REDD+, particularly the Forestry Research Institute of Ghana (FORIG) and the Cocoa Research Institute of Ghana (CRIG). The Forestry Research Institute of Ghana of the Council for Scientific and Industrial Research (CSIR) which has a statutory mandate to conduct demand-driven forest and forest products research for the sustainable management and development of the forest resources of Ghana is a strategic institution for the implementation of REDD+. With ForIG's quest towards innovative and sustainable technologies development programmes, REDD+ implementation can leverage on ForIG's technology and innovative approaches and models to optimise the successful design and implementation of REDD+ interventions. Particularly, its strategic human resource capital in both technical and governance research on climate change and environmental services are key to Ghana's REDD+ programme. The Cocoa Board has a mandate outside the implementation of REDD+. However, its research outfit, CRIG) and its extensive geographical presence across the high forest zone areas of Ghana promises a positive opportunity for effective implementation of REDD+. With recent events around the advancement of the ER-PIN, Ghana Cocoa Board (COCOBOD) will assume a more prominent role in Ghana's REDD+ context. There is therefore the need to develop cocoa sector development strategy that responds to this new REDD+ reality. This provides opportunity to integrate new technologies like, Agro-forestry and climate smart strategies, as well as other elements pertaining to the sustainability into sector planning. The end of 2015 should be targeted to complete the development of such strategy.

The Environmental Protection Agency (EPA) is also another crucial partner for Ghana's REDD+ programme. The Agency has jurisdiction to protect and improve land, air and water bodies from pollution and degradation. Therefore, the objectives of REDD+ falls in their domain of interest, making it an important partner. In terms of facilitating environmental policies and laws that support REDD+, the EPA can play a leading role. Again, for it to play the expected role, it is important that it is effectively integrated into the design and implementation of REDD+; by instituting a mechanism whereby there will be responsive and accountable participation of its representatives on specific committees.

## **3.4 Strategic governance interventions for REDD+**

An analysis of a number of technical studies and issues in the sector suggest critical areas of governance interventions that should help the effective implementation of REDD+ (Marfo, et al., 2013; Marfo, et al., 2012; Marfo et al., 2014; Dumenu et al., 2014).

Moving forward with implementing REDD+ actions, there is the need to

1. Clarify carbon tenure and develop an equitable benefit flow mechanism
2. Mainstream gender issues into REDD+
3. Institutionalize and sustain multi-stakeholder consultation and engagement in the sector
4. Institutionalize dispute resolution mechanisms that ensure proactive prevention and management of disputes that affect the implementation of REDD+

### 3.4.1 Carbon rights and sharing of REDD+ benefits

Per the recommendations of the constitutional review commission and the Government's white paper position, the preferred approach is to implement tenure reforms that tie carbon rights to land or trees and vest ownership with the holder of allodial or freehold title. Holders of derived rights such as tenant farmers should negotiate any REDD+ benefit and have contractual documentation to cover the agreement. This broad strategy follows the recommendation by Dumenu et al.; 2004, which further outlines some form of institutional arrangement and roles to implement the entire benefit sharing scheme of REDD+ (See table 3-1).

*Table 3-1: Description, functions, membership of proposed institutions for benefit sharing mechanism*

<b>Institutions</b>	<b>Description</b>	<b>Roles/Functions</b>	<b>Possible membership</b>
<b>National Carbon Fund</b>	Channel of receipt of all funds and revenues for national level projects governed by a board	Serve as a channel for receipt of all funds and revenues for national level projects. Payment form carbon benefits would be made from this Fund	
<b>Multi-stakeholder Governing Body</b>	Composed of two committees: Technical and Financial/Fund Management committees	Responsible for the technical and financial administration of REDD+ projects and funds disbursement	Forest Forum members National REDD+ Technical Working Group (MRV technical Sub-Working Group)
<b>Independent Monitoring and Audit Group</b>	Composed of certified auditors and civil society organizations to ensure accountability and transparency in REDD+ implementation	Monitor and audit the activities of the MGB, PIBs and the activities of a private developer engaged in REDD+ projects with communities	SESA technical Sub-Working Group
<b>Project Implementation Body</b>	District level REDD+ project implementation body	Responsible for management and coordination of REDD+ projects and payment of carbon benefits at the district and project level	Community Forestry Committees District Forest Forum members
<b>Carbon Registry</b>	A data management platform that serves to document, approve and track the development, compliance, performance, and transaction of emissions reductions from projects	Tracking of all REDD+ activities taking place within the country and monitor compliance to standards in carbon credit transactions irrespective of the financing mechanism	MRV technical Sub-Working Group

This strategy paper admits that the issue of benefit sharing is no near settled and that Ghana needs to embark on further broad stakeholder consultation. Thus, the final mechanism will evolve through both expert reviews and multi-stakeholder dialogue processes. A multi-stakeholder expert working group will be formed by the NRSC to facilitate the process of expert review and consultation until a national consensus is achieved.

### 3.4.2 Mainstreaming gender

Another major issue that emerges is how to mainstream gender in REDD+ implementation. The principal driving principle is to ensure that both men and women are fully recognised as forest stakeholders and that they have equal opportunity to develop their capacities and to participate, contribute and benefit from REDD+ initiatives. The main strategic option is to ensure that all deliberations, project designs and implementation clearly identifies how specific interventions will impact gender and to design equal opportunities for capacity building and equal measures that lessens the negative impact on particular gender group. In particular, women's representation in key REDD+ institutions and projects should be prioritized due to their historical alienation from decision making processes.

### 3.4.3 Institutionalising Dispute Resolution Mechanism

In recognition of the complexities surrounding REDD+ and forest governance in general, anticipating disputes or conflicts and instituting Dispute Resolution Mechanism (DRM) for the implementation of REDD+ is crucial. The recommendations by Marfo, Sarfo and Cobbina (2014) developed through extensive stakeholder engagements in the sector will be followed. The general strategy will be to depart from conventional litigation approach and employ Alternative Dispute Resolution (ADR), to institute and use the recommended structures, mobilise resources to build the critical capacities at all levels and to implement the procedures in the developed dispute resolution model. In sum, the stages of the DRM process, responsible institutions at various levels of jurisdiction and their identified capacity needs are given in Table 3-2.

*Table 3-2: Stages in the DRM process and institutional bodies responsible for managing them and their capacity needs*

Stages of the DRM process	Processes under the ADR Act	Responsibility			Capacity needs
		Community	District	National	
<b>Receive and Register (diagnose)</b>	Lodging of complaint/written consents	CRMC	CSO-FSD	DO-FC	Basic investigative skills & grievance documentation
<b>Acknowledge, assess and assign (diagnose)</b>	Pre-trial hearing	CRMC	DDRT	NDRT	ADR Act and procedures; content analysis and training in arbitration and/or mediation
<b>Propose a response (design)</b>	Mediation/ arbitration Hearing	CRMC	DDRT	NDRT	ADR Act and procedures; content analysis and training in arbitration and/or mediation
<b>Implement response (implement)</b>	Awards and Settlement	CRMC <sup>1</sup>	DDRT <sup>2</sup>	NDRT <sup>3</sup>	Drafting awards or settlement
<b>Review (evaluation)</b>		CSO-FSD	DDRT	NDRT	
<b>Grievance referred/closed out (exit)</b>	Consent for arbitration or refer to court				

<sup>1</sup>Collaborative resource management committee

<sup>2</sup>Membership of District dispute resolution team (DDRT)= The District Chief Executive (or his representative), District Forest Manager, One paramount chief chosen from among themselves if there are more than 1 in the jurisdiction, a senior district police officer, A citizen with substantial knowledge/experience in dispute settlement (lawyer, magistrate, ADR specialist etc.) to be appointed by the DFM in consultation with the District Forest Forum, The District Customer Service

Officer (CSO) only acts as secretary to the Team, One queen mother appointed by the paramount stools who have jurisdiction in the area.

<sup>3</sup>Membership of National Dispute Resolution Team: Head, legal unit of FC (also acting as Convenor), Head, FSD Operational Director, 1 forest governance expert (outside FC), Head, Climate Change Unit, 1 NGO representative nominated by a recognised NGO coalition body, 1 traditional authority nominated by the national house of Chiefs, Representative of Ministry of Food and Agriculture, Representative of COCOBOD, A representative of the FC Board, The Chief Executive, FC, The Executive Directors of FSD, Timber Industry Development Division and Wildlife Division.

The overall strategy to implement the DRM for REDD+ will follow the steps outlined in Table 3-2.

*Table 3-3: Summary of recommended actions and institutions responsible for their implementation in piloting and scaling up a REDD+ DRM process*

Action for implementation	Responsibility	Comment
<b>Conduct stakeholder consultation on DRM mechanisms developed</b>	FC	REDD+ secretariat may take this up
<b>Set up the DRM teams in REDD pilot communities and Districts and pilot</b>	FC	For resource and capacity constraints, the piloting should be progressive. For instant, start with one REDD pilot project and set up the arrangement across community, District and national scales
<b>Study the functioning of the piloted DRM and document lessons</b>	FORIG to lead	Use 5 member multi-disciplinary research team consisting of policy and governance expert (FORIG), lawyer (FC), Social forester (RMSC), conflict management scholar and forest landuse management expert
<b>Share lessons with stakeholders and agree on broad strategies for revising design and implementation</b>	FC	Use an multi-stakeholder dialogue process such as a National Forest Forum (plus). Other key stakeholders such as COCOBOD, MOFA, Chamber of Mines, Minerals Commission, EPA are recommended
<b>Scale up and institutionalise DRM</b>	FC Board	A paper on institutionalising DRM in forest governance should be submitted to FC Board. It should document the DRM development process, the lessons learnt and cost of implementation.
<b>Capacity building</b>	FC commission experts	Experts to assess specific capacity needs of responsible agencies/personnel. FC to prepare training programme and budget Commissioned Trainers to train responsible bodies/personnel

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### ***3.5 Institutionalizing multi-stakeholder dialogue process for REDD+***

Finally, as REDD+ emerges, its form and content will bring many complicated issues that will require continuous stakeholder consultation, dialogue and consensus. To that end, REDD+ should leverage on the ongoing effort to institutionalize multi-stakeholder dialogue in the forestry sector. It should build on the existing collaborative arrangement between Tropenbos International and the national forest forum where ‘Forest Forum’ is being adopted and used as the umbrella platform for MSD in the forestry sector. The effort should be supported and capacity building of stakeholders to institute democratic representation in the process should be strengthened. REDD+ should leverage funds and resources to move the process forward as it is anticipated that emerging issues related to carbon rights, benefit sharing and so on will all benefit from a strong and legitimate MSD platform.

## 4. Tracking REDD

### 4.1 Background and context

Monitoring, measuring, reporting and verification (MMRV) systems can be broken down into four major components:

- i. Forest monitoring (M1),
- ii. Measurement (M2),
- iii. Reporting systems (R)
- iv. Verification (V).

Together, these concepts constitute the backbone of REDD+ implementation by providing a resource tracking and inventory system of land use and land-use change and their related emissions.

Forest monitoring (M1) systems are the physical and technological systems that are used to generate forest-cover data and detect and quantify changes observed in forest cover (including above- and below-ground biomass, forest types, canopy density, etc.). The information that is collected in forest monitoring systems are the primary data source and are therefore critical for the overall accuracy and precision of MMRV systems. As such, forest monitoring systems need to be comprehensive enough to allow the tracking of all forests in a country as well as sensitive enough to be able to detect forest presence/absence according to the country's forest definition.

Measurement (M2), Reporting and Verification (M2RV) systems in contrast are a combined set of methodologies and standards that are used to translate primary data into measurable and reportable emissions estimates that are verifiable by an external entity or authority. For much of the purpose of this section, the external institution that we are reporting to will be the United Nations Framework Convention on Climate Change (UNFCCC) under a possible global REDD+ architecture; however, it is also possible to develop MRV systems under other third-party entities such as the Verified Carbon Standard (VCS); the Climate, Community and Biodiversity Alliance (CCBA) or the American Carbon Registry (ACR). It is important to emphasize that in the context of Ghana, efforts are already underway to implement REDD+ activities at the jurisdictional and project levels which will be premised on VCS and CCBA standards, but also a national monitoring and reporting regime of GHGs to the UNFCCC is already on-going, under the National Greenhouse Gas Inventory (NGHGI). Thus, as Ghana's REDD+ implementation structure evolves, it is important to consider MRV systems and modalities for project, jurisdictional and national levels, including possible options for combining these modalities in a seamless MRV implementation system.

Monitoring, measurement, reporting and verification (MMRV) is the combination of the two systems above, with the purpose to track changes in forest areas in a way that is transparent, consistent, and accurate and reduces uncertainties as encouraged by the IPCC. This is critical in order to establish whether or not the country's interventions are having positive or negative effects in forest ecosystems over time. MMRV systems are often discussed in the context of climate change, and therefore measuring greenhouse gas (GHG) emissions will be important. They can also help track a range of other indicators (e.g. biodiversity, hydrology, cultural values). This section will predominantly be focusing on GHG emissions MMRV systems from all land uses, recognising that developing MMRV systems across a range of indicators and land use systems will improve both the efficiency and effectiveness of Ghana's tracking systems.



The Forestry Commission did contract Indufor OY to develop reference levels for forest emissions as a result of deforestation and forest degradation. The Report has extensive sections on GHG measurements, including field protocols. While the report dwells on forests as a land use, which ensures that deforestation, degradation and forest carbon stocks enhancement can be monitored, guidance relating to other land use systems remain unaddressed, i.e. cropland and grasslands, noting also that settlement and other lands hold limited opportunities for REDD+ interventions. But moving forward, it is important to move beyond current mechanisms for monitoring deforestation to a more robust system that can assist in measuring degradation and forest carbon stocks enhancement.

## 4.2 Accounting for GHG Emissions in Ghana

Countries that enter into the REDD+ mitigation mechanism will have to establish a national forest monitoring system (UNFCCC Article 1(d)) that should support a Measurement, Reporting and Verification (MRV) requirement under the Convention. Furthermore, the decision states that countries will have to use the IPCC's most recent guidance as adopted or encouraged by the Conference of Parties (COP) as a basis for estimating anthropogenic forest-related GHG emissions by sources and removals by sinks, as well as forest carbon stocks and forest area changes (UNFCCC Article 1 (c)). In this way, emission estimates will be based on a common international methodological approach (IPCC) for MRV for REDD+.

Accounting for GHG emissions from deforestation or degradation requires information on both the area of forest loss and the corresponding carbon stored in the land that is cleared. Both are challenging to quantify accurately. A National Forest Inventory (NFI) is one option for REDD+ countries such as Ghana to be able to estimate anthropogenic forest related GHG emissions. Some REDD+ countries already have existing data and on-going NFIs (e.g. Indonesia, Cameroon). Others countries do not, or have inventories that are extremely out of date (e.g. the Democratic Republic of Congo). An assessment of existing data sets of Ghana's forests showed that there is no comprehensive data available that can provide reliable estimates of carbon stocks (Ghana RPP, 2010). However, a recent inventory conducted in Ghana under the Forest Preservation Project (FPP) of the Forestry Commission has generated very useful forest carbon data that has been extremely useful in the estimation of emissions and removals for Ghana's Third National Communication to the UNFCCC.

For countries that have existing data and NFIs, the challenge will be to evaluate if and how these systems can be used to report under the UNFCCC. For countries that do not have NFIs, the challenge is then how to design and carry out an NFI as early as possible, with the specific objective of being able to report on GHGs following the IPCC guidance and guidelines. Though the FPP report generated carbon stocks data, experience with the accounting activities during the Third National communications showed gaps that need to be filled (please refer to Ghana's Third National Communications document of the Environmental Protection Agency (EPA)).

The IPCC guidance and guidelines were not explicitly developed for REDD+, although this may be envisaged in the near future. More importantly, some critics (e.g. Saatchi et al., 2011) have expressed doubts whether this can be done accurately owing to the natural spatial variability of forest biomass, even within individual forest types. They also raised concerns about the capacity of many REDD+ countries to undertake a national forest inventory given their national circumstances, budgets, and the availability of human resources. For instance, the 2006 IPCC guidelines call for the estimation of carbon stocks and their transfers in all the pools and land types (i.e. cropland, forestland, grasslands, wetlands, settlement and other lands) as well as in the different ecological zones, soil types and climatic zones. This is a huge task, which will result in a complex land-use matrix, and operationally it means that Ghana would have to go beyond the conventional forest inventory, with its cost implications, to be able to conduct GHG accounting in line with these guidelines. The most accurate ground-based measurement methods for above ground biomass<sup>1</sup> (AGB) are generally only carried out over a small sample of the forest due to the high cost and the time-consuming nature of field sampling. In the case of Ghana, the country's capacity and resources to accurately measure and monitor (thus repeated every 3 to 5 years) carbon stocks, and to account for national emissions in line with the requirements of the IPCC guidance and guidelines are limited.

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<sup>1</sup> Field-based measurements of all stems in a plot above 10 cm diameter at breast height (DBH)



As a result of all these factors, many people agree that it will be extremely challenging for many REDD+ countries, especially those in Africa, to fully implement IPCC guidance and guidelines in an accurate and efficient way. Realistically, there is a strong need to demonstrate new options or improve upon existing methods for estimating the amount of carbon stored in forests in line with countries' capacity and national circumstance.

In the tropics, estimates of biomass remain uncertain. The largest proportion of this uncertainty is in estimates of AGB, which accounts for 70–90% of forest biomass carbon, and the spatial heterogeneity that depends on factors such as climate, anthropogenic and natural disturbance and recovery, soil type, and topographical variations. In Ghana, carbon stock variation due to land-use and land-use change has caused significant heterogeneity within and across landscapes that are best described as complex mosaics of agricultural systems, fallow lands, and forest patches.

### ***4.3 National and Sub-National Carbon Stocks in Ghana***

For the first time, Ghana has a powerful estimate of total above ground national carbon stocks (1.7 Gt), as well as the capacity to estimate carbon stocks and associated uncertainty levels at the project or landscape scale (250 meters resolution). As a means to observe trends across landscapes and regions, the biomass carbon map (

Figure 4-1) and uncertainty map (Figure 4-2) show distinct variation in the distribution of aboveground biomass between major vegetation and land cover types. The northern and coastal savannah areas showed the lowest biomass stocks (1 to 75 Mg/ha  $\pm$  1 to 10), whereas the tropical high forest zone has the highest biomass; ranging from 100 to 400 Mg/ha ( $\pm$  60 to 80 Mg/ha).

From a regional perspective, almost two-thirds of Ghana's landmass has biomass stocks below 75 Mg/ha, which includes the three northern Regions, the Greater Accra Region, substantial parts of the Brong-Ahafo Region, as well as parts of Central, Eastern, Volta and Ashanti Regions. The remaining one-third of the country has biomass stocks between 75 and 400 Mg/ha, predominantly in the Western Region, and remaining parts of the Ashanti, Eastern, Volta, Central, and Brong-Ahafo Regions.

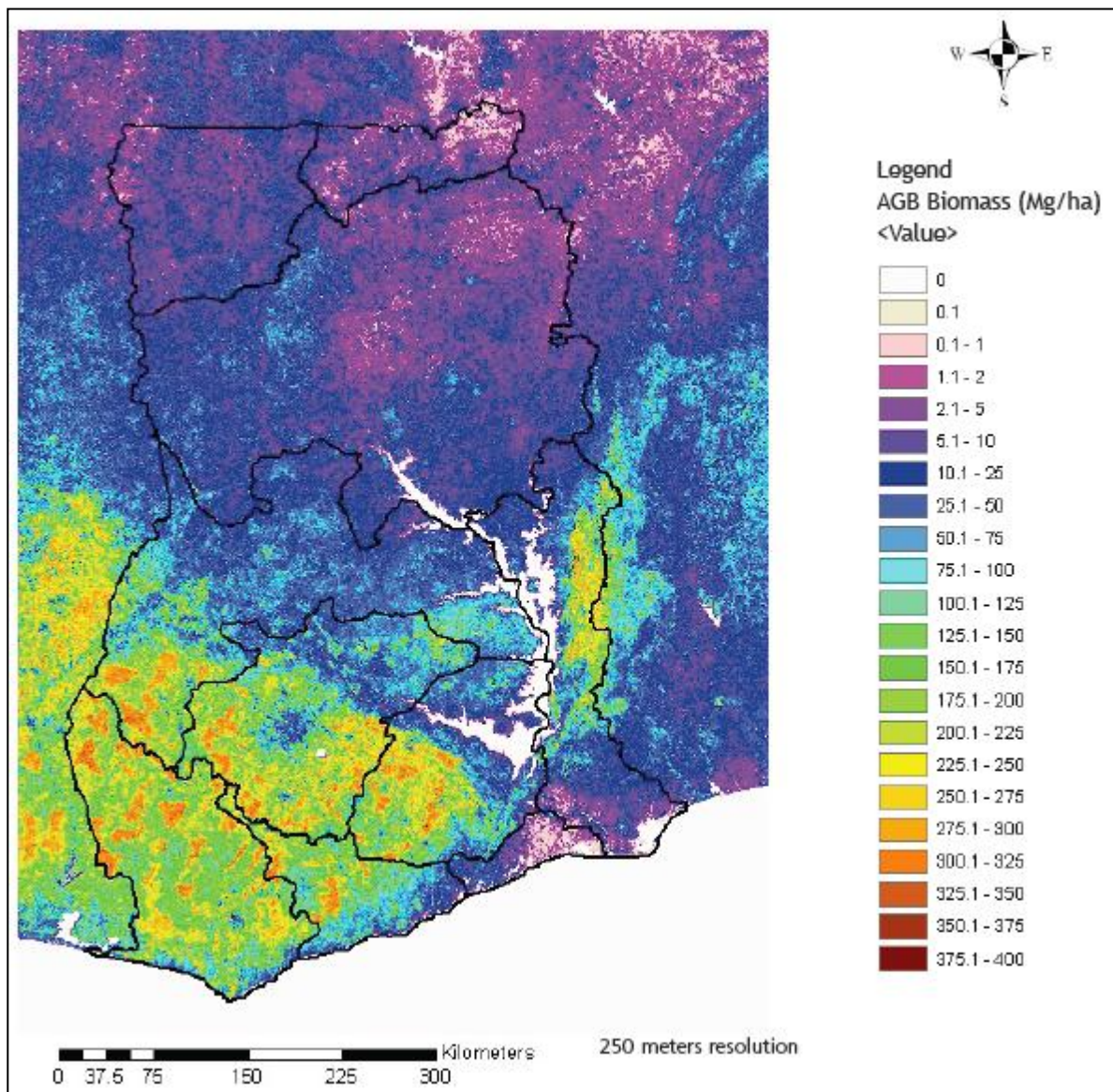
The map also distinctly highlights the localized heterogeneity of biomass and the role of anthropogenic activities and drivers. For example, in areas of relatively low biomass, pockets or stretches of surprisingly higher biomass are evident, reflecting in some cases protected areas (Mole National Park in Northern Region) or "forgotten" forest/tree crop systems (forest patches and cocoa farms in Volta Region). In fact, although the Volta Region is not noted for high forest cover, the high biomass stocks found in the east edge of the region—ranging from 125 to 250 Mg/ha—are comparable to that of the high forest zone.

Within the high forest zone, the difference between the biomass found in forest reserves and protected areas, and the biomass in off-reserve areas dominated by agriculture and tree crops is clearly evident. Even though the high forest zone has the highest overall biomass, the biomass in forest reserves ranges (making up approximately 30% of the high forest zone) from 225-400 Mg/ha, although the uncertainty is also quite high ( $\pm$  70 to 80 Mg/ha). The remaining 70%, which falls within the "off-reserve" area of the high forest zone contains biomass ranging from 125 to 225 Mg/ha ( $\pm$  70-80 Mg/ha). What the map also reveals is that in the high forest zone, biomass declines as one progresses further outside of protected areas. Thus, there are clear bands or buffers surrounding the forest reserves and protected areas that has higher biomass (225-250 Mg/ha) than the rest of the agricultural landscape. This indicates that over the past century, with the expansion of agriculture deforestation and degradation have contributed to a significant reduction in carbon stocks.

Within single land use types in the high forest zone, like protected forests, the map indicates that degree of heterogeneity between reserves and parks. Reserves and protected areas in the southern parts of the Western Region have less biomass (e.g. Ankasa National Park- approximately 225 to 270 Mg/h) than other reserves and protected areas in other regions (e.g. Kakum National Park- approximately 300 to 350 Mg/ha). In trying to understand this difference, it is worth noting the importance of tree height in calculating biomass estimates. Studies have shown that the trees in the wet evergreen forest (found in south western Ghana) have comparatively lower tree height than those in the other forest types of the high forest zone. This difference in tree height may be partially responsible for the lower biomass displayed in south western Ghana.

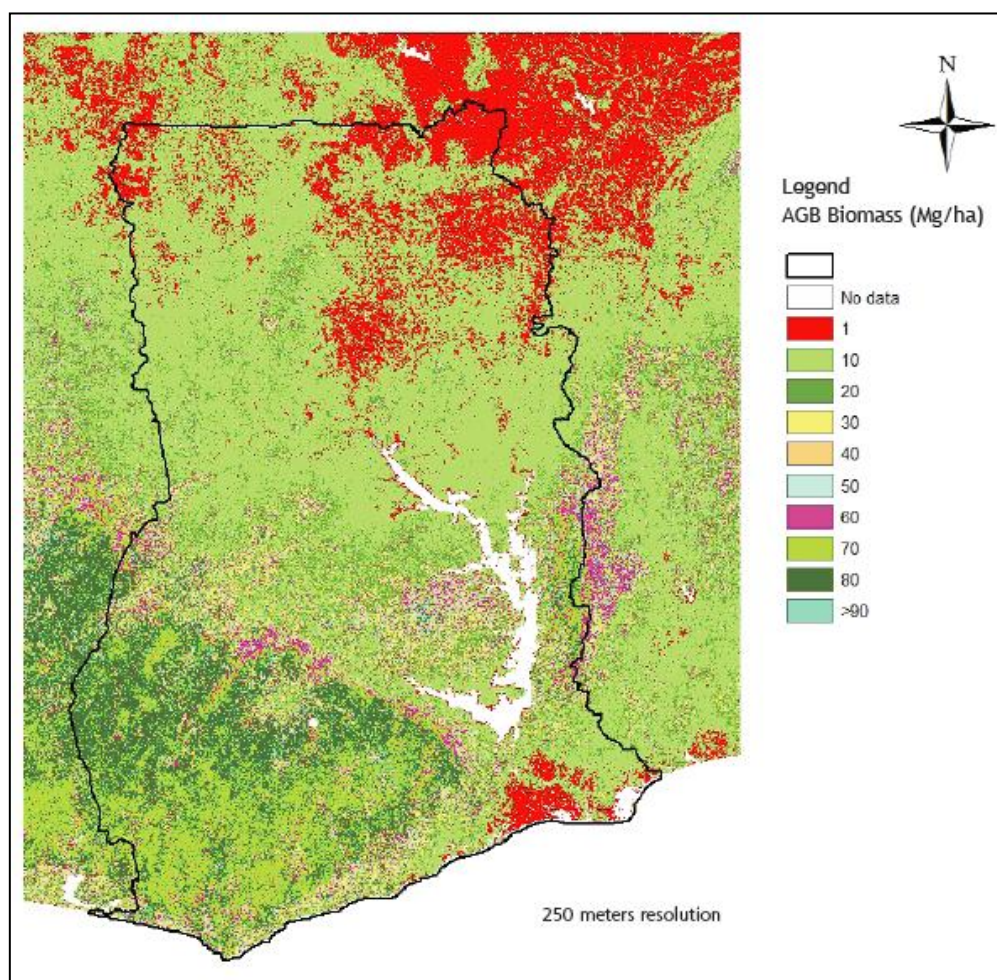
Within single management units, like forest reserve or national park, biomass heterogeneity is also dramatic. Even though most reserves appear to be in good condition, the extent of colour differences between pixels within the boundaries of individual reserves highlights the extent of the high forest degradation; largely driven by illegal cocoa farms, illegal food crop farms, unsustainable logging practices, illegal logging and fire. All of these practices have resulted in significant damage to the residual vegetation and poor seedling/sapling recovery or regeneration.

Finally, at a broad scale, the biomass map and associated absolute error map confirm that areas with the highest biomass have the highest amount of uncertainty; a reflection of the mosaic nature of Ghana's high forest zone, and the persistence of deforestation and degradation activities. In comparison, areas with low biomass also have very low uncertainty levels.





*Figure 4-1: Biomass Map of Ghana (2008/2009) showing biomass figures in MgC/ha. Carbon stocks are approximately 50% of the biomass values*



*Figure 4-2: Absolute error distribution for the Biomass Map of Ghana, Biomass Map of Ghana (2008/2009)*

## 4.4 Value and Applications of Carbon Maps in Ghana's MRV system

Biomass carbon maps can have tremendous value for REDD+, both at national and sub-national scales, and can be an extremely useful resource for the wide range of stakeholders engaged in REDD+ readiness in the developing work. This section highlights the value and potential uses of a biomass carbon map from the national to the sub-national and project level. Biomass maps can help to build much needed in-country capacity and technical skills. They can inform REDD+ and climate-smart policy development and planning to curb GHG emissions from the Land Use, Land Use Change and Forestry (LULUCF) or Agriculture, Forestry and Other Land Use (AFOLU) sectors. They highlight neglected ecosystems and can assist with vegetation biomass stratification. A national biomass map can jump-start the development of carbon projects and carbon accounting, and can support longer-term efforts in monitoring, reporting and verification. Biomass maps can also explore the potential of the latest cutting edge techniques and satellite sensors, thereby offering developing countries a more efficient, economical, and effective method by which to assess and monitor biomass carbon stocks. Many of the potential applications that are described at a national level are also relevant at the regional/jurisdictional scale and for pilot initiatives.

### 4.4.1 National

**Informing policy and planning:** Carbon maps can provide critical information to governments (both at national and state levels) to inform policy development and to guide planning or implementation of activities. A carbon map can show priority areas for carbon stock conservation (REDD) and/or enhancement (REDD+ or AR). It can also reveal locations of extremely low biomass where interventions would be challenging or unfeasible. In addition to highlighting high biomass landscapes that are already well known, the map is likely to reveal ecosystems with significant biomass carbon stocks that have been neglected.

**Emissions accounting and reporting:** At a national level, these maps can help to meet reporting obligations on carbon emissions by sources and removals by sink by providing a baseline of national land-based carbon stocks. If mapping is carried out over time, then AFOLU or LULUCF sinks and removals are potentially quantifiable.

Specific to the IPCC AFOLU reporting framework, the role of the carbon map could be threefold: It could provide for gridded emission factors (or carbon densities per hectare) at a given spatial resolution, which would be combined with spatially explicit deforestation (or degradation) patterns to calculate gross emissions. The carbon map could be used to generate activity data indicating changes in forest cover, if a time series of carbon maps are developed, and if the differences in carbon densities are significant. As a consequence, it could be used to directly assess carbon stock changes combining the detected spatial patterns of carbon stock changes with the carbon stock differential at each grid cell.

**Calculating reference levels:** All countries participating in a future policy mechanism to reduce emissions from deforestation and forest degradation will need to develop national to regional scale estimates of historic emissions (~2000–2010), depending on which option suits the country. Most developing countries currently have limited data on forest carbon stocks with which to estimate trends in historic CO<sub>2</sub> emissions from deforestation and degradation. Instead, countries often rely on estimates based on old or incomplete NFI, which are limited to “protected” forests and not necessarily reflective of forest and trees in agricultural lands. These estimates traditionally either focus on timber stocks or volumes (e.g. the FAO (2006) Forest Resource Assessment from 2005) and not biomass, or on Tier 1 biome-level estimates reported by the IPCC. The Ghana RPP provides a strong assessment of the difficulty and near impossibility of using existing data sets and NFI’s to estimate Ghana’s reference level for the REDD+ mechanism. In addition, neither FRA nor IPCC estimates are spatial in nature, and thus do not allow for matching carbon stock data with the areas undergoing change.

Carbon maps can therefore assist national efforts by providing national to fine scale, spatially explicit, consistent forest carbon estimates. When these estimates are paired to distinct land use types then associated emissions, with uncertainty estimates, can be calculated from changes in land use or vegetation types, as documented by available remote sensing imagery that covers the past decade.

**MRV:** A biomass carbon map can jump start and provide long-term support to monitoring, reporting and verification efforts. A biomass map can have extensive utility in establishing of a baseline against which future stock changes (whether from deforestation, degradation or biomass enhancement) can be assessed. For example, if carbon mapping is continued over time (e.g. a map is developed every 3-5 years) then it is possible to monitor changes in biomass over time and subsequently report on these changes and the associated emissions or removals. In addition, if biomass values/ranges are equated to distinct land use types (vegetation cover types) then it is also possible to monitor changes in land use over time and subsequently calculate associated changes in biomass. The second option could operate on a shorter time scale, i.e. in between carbon mapping efforts.

**Informing forest definition:** A biomass carbon map can help to inform decisions on forest cover definition and setting of forest – non-forest boundaries (for REDD+) based on defined threshold values for carbon stock densities or other structural parameters (e.g. tree height, canopy cover, and area). A biomass carbon map can also be used to stratify vegetation biomass types, which could be useful in defining REDD+ strategies or identifying project methodologies.

**Forest Management:** From a forest management and planning standpoint, biomass carbon maps can help to inform forest managers about the condition of their forests, without having to solely rely upon the word of field staff or necessitating field trips or sampling exercises. By using a biomass map, a forest manager or conservationist can assess biomass estimates across the landscape and determine whether degradation, deforestation, or even carbon stock enhancement (from regeneration and regrowth) is taking place within a forest reserve or protected area.

#### 4.4.2 *Sub-national/Jurisdictional*

**Defining regional boundaries:** If a country wants to implement REDD+ at a sub-national scale and administrative boundaries are not necessarily appropriate for REDD+ implementation, then the biomass map can help with stratification based on biomass (as well as other key factors, like localized deforestation rates and drivers of deforestation) to identify appropriate REDD+ regions.

**Setting regional / jurisdictional baselines and performing MRV:** Biomass maps can calculate carbon stock baselines and CO<sub>2</sub> emissions baselines within regional or sub-national boundaries. Depending on the availability of historical data or imagery, sub-national biomass values can help to set historical baselines. Mapping repeated over time and coordinated with analysis of land use and land use change can also inform sub-national or jurisdictional MRV efforts as REDD+ moves forward.

#### 4.4.3 *Projects*

**Project selection:** A biomass carbon map can assist in the selection of ecosystem carbon projects by showing where there are key opportunities as evidenced by biomass estimates from selected landscapes.

**Project development & baseline setting:** Biomass carbon maps can assist project developers and communities in identifying viable project boundaries based on variations in biomass. It can provide carbon stock estimates on a pixel by pixel basis (using the map using GIS software), enabling a distinction in biomass carbon according to different land use types, proximity to human settlements, or other variables. It can support the development of initial project level carbon stock baselines (unless already set in accordance with a regional baseline), and in combination with known deforestation rates biomass maps can facilitate initial establishment of project baselines.

Ready access to the type and quality of data available through biomass maps greatly reduces the costs that project developers and/or communities would otherwise have to incur in the early stages of project development. This can be especially valuable if the biomass data shows that a project not viable due to low carbon stocks (at the proposed geographic scale), and therefore does not warrant further investment or development. On the other hand, access to this type of data can move a project forward to a point where carbon finance can be accessed to support more detailed project development (like PDD development and definition of a methodology).

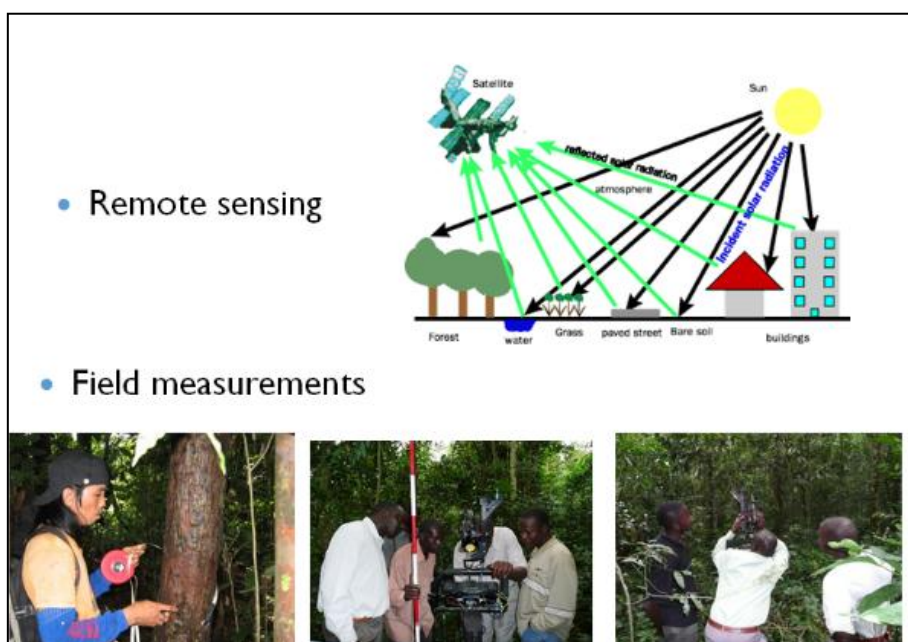
### 4.5 *Measurement component*

Forest carbon emissions are calculated by combining the change in forest area and emission factors (IPCC 2006; GOC-GOLD 2012). The change in forest area (ha) can be estimated from a wall-to-wall mapping or sampling of remote sensing data. Forest degradation generally results in small changes in canopy cover so the areal extent of degradation is more difficult to detect with optical remote sensing than the areal extent of deforestation (DeFries et al., 2007). Airborne laser altimetry (such as light detection and ranging —LiDAR) produces promising results for monitoring degradation (Asner et al., 2010), but some groundbased carbon inventory may still be required to estimate and monitor forest degradation.



Emission factors are derived from the changes in carbon stocks per unit area ( $\text{t C ha}^{-1}$ ) under different land use changes. The changes in carbon stocks must be estimated in five carbon pools: aboveground biomass, belowground biomass, dead wood, litter and soil organic matter (GOFCCGOLD 2012). Above- and belowground carbon stocks are generally estimated using an allometric equation that is developed from the measurements of local biomass for a specific area or forest type. To calculate carbon stocks in dead wood, samples of dead wood are usually collected along a transect and dried to calculate their density. Litter is generally collected with trays over a period of time, removed, dried and weighed. Soil carbon stocks require a laboratory analysis of soil samples to estimate the bulk density and percent of soil carbon, which can be costly. New approaches using near-infrared scanning technology to reduce the need of lab analysis are underway but require the establishment of calibration models and these are not yet widely available. Two methods can be used to estimate the change in carbon stocks: gain–loss and stock-difference (GOFCCGOLD 2012). The gain–loss method estimates the net balance of gain (vegetation growth) and loss (wood removal and disturbance) of carbon stocks. The stock-difference method estimates the difference in carbon stocks at two moments in time in a carbon pool.

The data and methods used to estimate the change in carbon stocks are categorized into three tiers, with increasing levels of data requirement and accuracy (Table 4.1). The changes in carbon stocks of significant pools should be estimated using a higher tier to reduce uncertainty and increase accuracy. To obtain REDD+ incentives, Tier 3 data and methods are likely to be required in the estimation of carbon stocks. Thus, significant efforts in readiness activities have been dedicated to increase the capability of non-Annex I countries to collect and analyze Tier 3 data.



*Figure 4-3: Forest monitoring using a combined approach of remote sensing and field measurements*



*Table 4-1: Summary of the tier system and its requirements for data and methods to estimate factors (IPCC, 2006; GOF-C-GOLD, 2012)*

	Tier 1	Tier 2	Tier 3
Emission factors	IPCC default factors	Country-specific factors	Estimated from forest carbon inventory and /or a calibrated process model
Spatial and temporal resolution of data	Low	Medium	High
Estimation of net emissions from deforestation	Assumed to be instantaneous	Assumed to be instantaneous	Modeled transfer of carbon stocks between pools over time
Estimation of net emissions from degradation	Gain-loss method	Gain-loss or stock difference methods	Stock difference method

## 4.6 Reporting

Forest carbon emissions must be reported in the national anthropogenic GHG inventory, which is submitted to UNFCCC. Detailed reporting guidelines for annual GHG inventories have been set out in the 2006 IPCC Guidelines on Agriculture, Forestry and Other Land Use (IPCC 2006) for Annex I countries. The general principles for estimating and reporting GHG emissions and removals are transparency, consistency, comparability, completeness and accuracy. The same guidelines and principles are likely to be used for non-Annex I countries that participate in REDD+, although they are not required to produce an annual GHG inventory immediately.

Although the estimation and reporting of forest carbon emissions are conducted at the national level, the changes in carbon stocks are likely to be reported at multiple levels. The proponents of REDD+ activities at local and sub-national levels need to report changes in carbon stocks to an MRV institution at the next governance level and potentially to other institutions or agencies (e.g. funding agencies). The estimation of national carbon emissions may also rely on the national forest inventory (Tier 3), which systematically and regularly collects in situ carbon stock data across the country. Thus, a consistent reporting procedure for carbon stock data is required within the multi-level MRV system.

## 4.7 Verification

Verification is a collection of activities or procedures to establish the reliability and accuracy of the GHG inventory (IPCC 2003). It can be performed at project, sub-national, national and international levels. It may involve the comparison of inventory estimates against estimates that are independently derived, or the examination of data quality, upscaling procedures. The 2003 Good Practice Guidelines for Land Use, Land-Use Change and Forestry (GPG-LULUCF) recommends five approaches that can be used to perform verification of the inventory estimates (IPCC 2003):

- Comparison against other information, such as independent inventories or international datasets
- Application of higher tier methods
- Direct measurement of GHG emissions and removals
- Remote sensing
- Application of a process model.

Internal verification can be performed by the agency responsible for the national GHG inventory, while external verification is performed by an independent organization (third party).

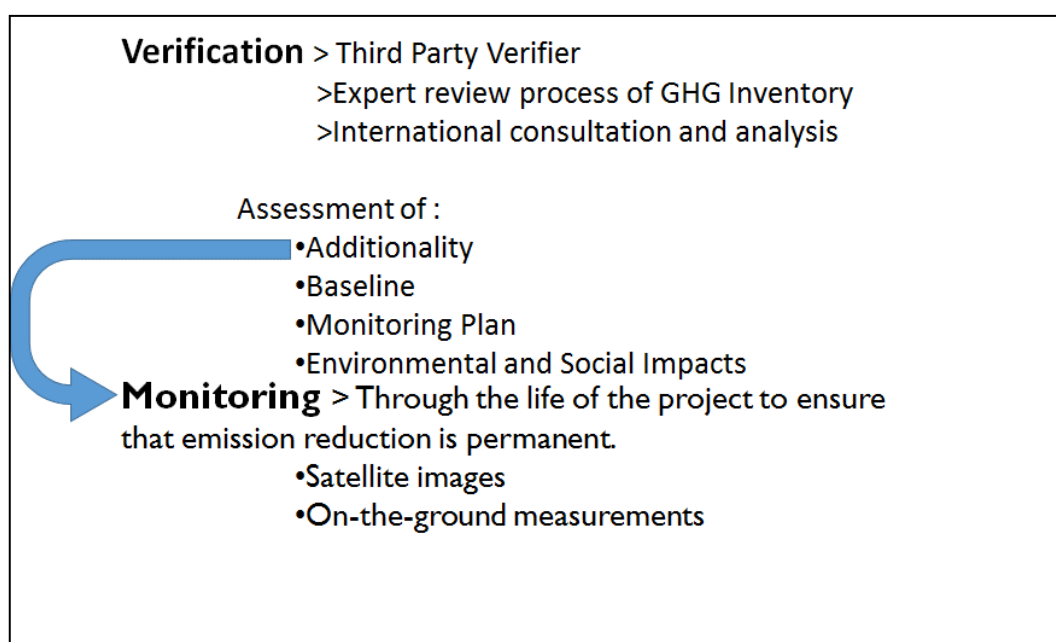


Figure 4-4: Verification and monitoring description for REDD+

## 4.8 Challenges in MRV implementation

A credible national MRV system requires forest monitoring and inventory data, as well as the institutional capacity to produce and report GHG inventory estimates of the LULUCF sector. The system also needs to integrate data across a range of scales and levels. However, medium to large capacity gaps in establishing a national forest monitoring system for MRV have been identified in most tropical non-Annex I countries. They are mostly due to a lack of data (especially carbon stock measurements); limited capacity to collect, manage and analyze data; and limited access to technology and resources. Even though Ghana has advanced quite well in terms of data, there still remain gaps in accessing data in different land uses system, particularly relating to emission factors. As the country progresses into a possible project level piloting of REDD+ and a jurisdictional intervention, it is important to move beyond IPCC default values, which are noted to be have high uncertainty, to country level figures.

It is also imperative to consider that fact that an MRV system for REDD+ should not only target GHGs, but a comprehensive MRV system should also monitor social impacts of REDD+ on the local communities (i.e. livelihoods, environmental awareness, empowerment), ecosystem responses and biodiversity to ensure that REDD+ safeguards are implemented and ultimately guarantee co-benefits of REDD+. However, this may place an additional burden on the development of such a system. If these attributes are included in the design of multi-level MRV, the overall cost of data collection might be lower than collecting and managing the carbon stocks and REDD+ safeguards separately (outside MRV).

## 4.9 Institutional arrangement for REDD+ MRV in Ghana

The responsibility to measure and report net GHG emissions will be allocated to the proponents of REDD+ activities and the national MRV Institution. The proponents of REDD+ activities may include regional and/or district government, non-government organizations or civil societies, private entities and community groups that implement these activities. They will also be responsible for establishing, monitoring and reporting REDD+ safeguards, co-benefits and drivers of deforestation and forest degradation. The sub-national MRV working units at the regional level will conduct (or collect from REDD+ proponents) more detailed measurements of carbon stocks, report the measurements to the national MRV Institution and solve administrative boundary issues related to leakage. The proposed national MRV Institution will collect measurements and monitoring data from various government ministries and agencies, and other stakeholders (Figure 4-4). The stock-difference method will be used to calculate emissions and removal of GHG. The change in land cover and use will be monitored using wall-to-wall remote sensing data. National emission factors for a range of ecosystems will be developed based on carbon stock data from the permanent sample plots, which have been established as part of the National Forest Inventory (NFI) and production forest monitoring. Some of the anticipated challenges in developing the national MRV system include the difficulty in setting up protocols and standards for data collection and processing (e.g. spatial data), obtaining continuous and up-to-date data, coordination and cooperation.

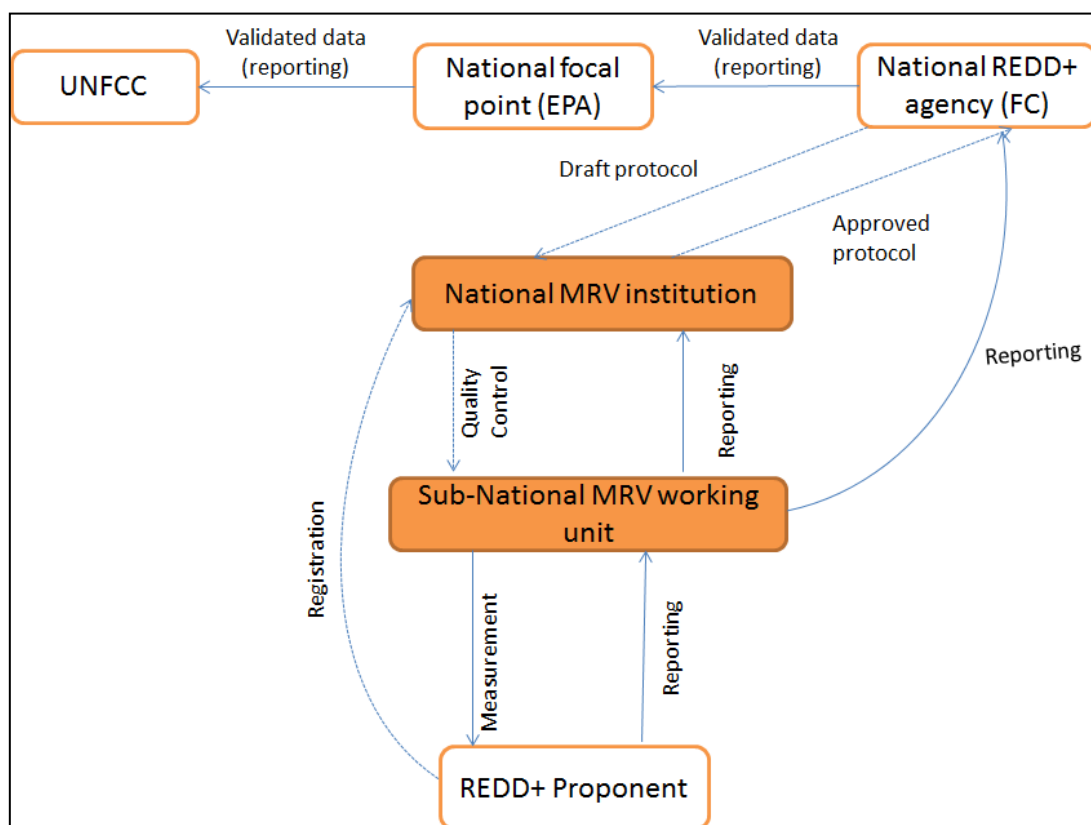


Figure 4-5: Flow of measurement and reporting in the multi-level MRV System Source: Adapted from REDD+ Task force 2013

#### 4.9.1 Institutional Design, roles and reporting lines for Ghana's MRV system

It is highly recommended that in moving forward with an institutional arrangement for REDD+ implementation in Ghana, the work done by the EPA to design an institutional arrangement for the National GHG Inventory should be seriously considered. This institutional arrangement is already being tested under the Third National Communications. The institutional design attempts to comprehensively improve upon the existing arrangement, which is generally adhoc and not backed by any formal collaborative mechanism. The institutional arrangement seeks to contribute to addressing the gaps identified in the adhoc arrangements, by facilitating wider participation of major state and non-state agencies, having clear institutional roles and reporting lines and decentralizing the GHG inventory activities from frontline agencies to research, academic and partner sector institutions. These objectives are very important to making sure that the entire national inventory system is able to respond to the emerging reporting needs in any future mechanism (NAMAs and REDD+) more effectively and efficiently.

The new institutional arrangement, as established by the EPA is formulated in four interactive hierarchical levels. At the top of the hierarchy, institutions will play oversight and strategic role in providing direction of the entire inventory process as well as interface the inventory process with the national communication process. The Environmental Protection Agency (EPA), which has the statutory mandate for the GHG inventory will be singularly responsible for the overall planning delivery and reporting of the national process. The office of the UNFCCC focal point at the EPA will be responsible for the overall technical coordination. The output of the activities at the next lower level will be fed into the higher tier and will be supervisory and technical in nature. Five institutions will constitute the supervisory team. Each team member will be responsible for different component of the national inventory (figure 8) including, inventory compilation, QA/QC management, uncertainty assessment, generalist activities/international GHG specialist, national archiving and documentation etc.

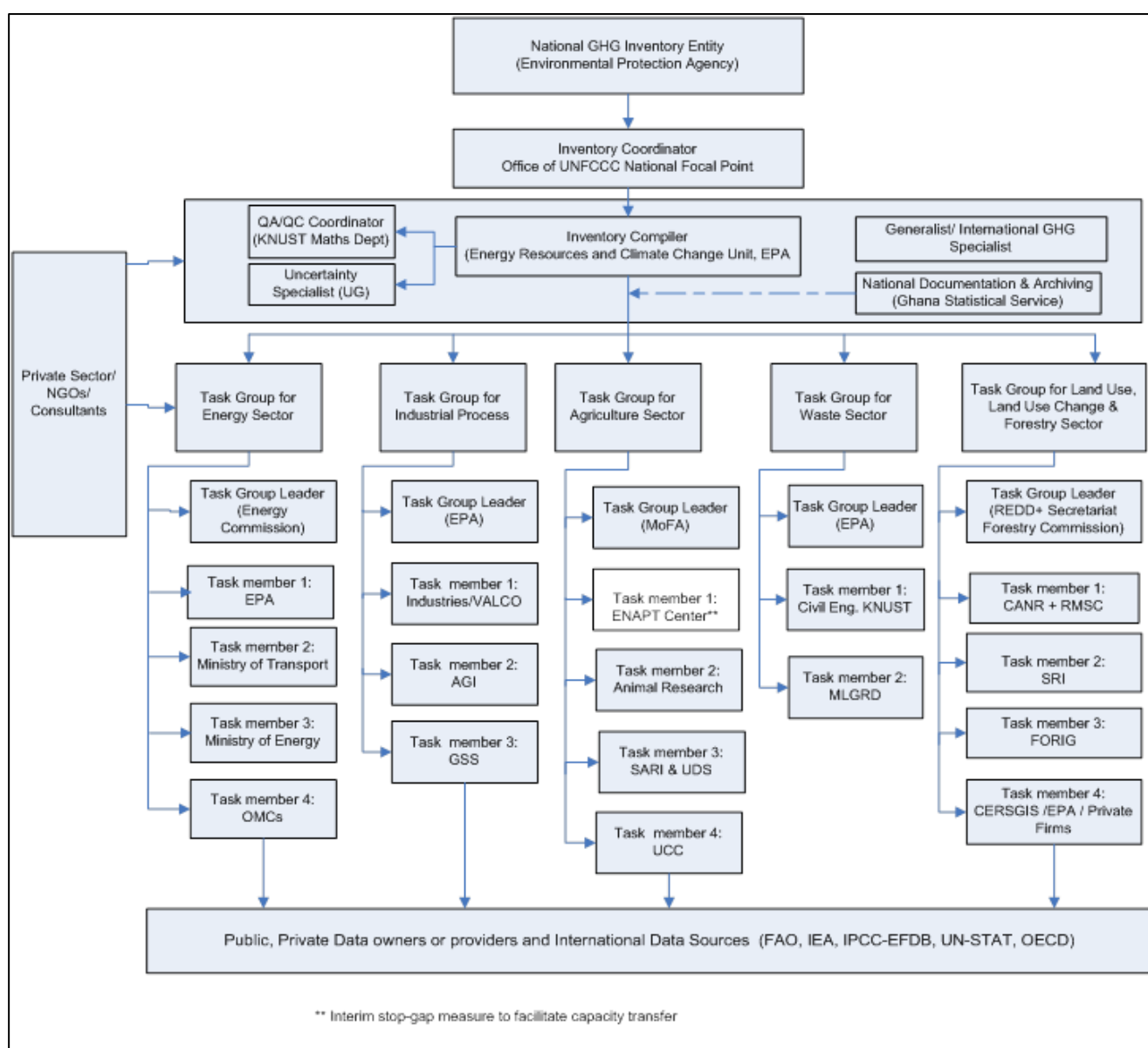


Figure 4-6: Institutional arrangement for the GHG inventory in Ghana

The actual inventory activities will be undertaken at the sector-level. Five sub-task groups will be constituted into a team responsible for producing inventories for the five sectors (energy, waste, land use change and forestry, industrial processes and agriculture). Each sub-task group will consist, at most of four institutional representations and sub-task group lead-institution. The activities of the sub-task groups will interface with that of the supervisory team during the various stage of the inventory through their respective institutions. At the lower end of the institutional arrangement is the roles played by the various data providers (national and international orientation). It also instructive to recognise the crosscutting roles of NGOs, private sector and consultants.

#### **4.9.2 Upper Tier Institutions**

Brief description of the roles and flow functions of the various institutions in the upper tier is provided under this sub-section.

#### **4.9.3 Environmental Protection Agency**

The EPA is the designated national entity legally responsible for producing the greenhouse gas inventory. The national entity is defined here as the institution that has the legal authority within the national government to prepare the national GHG inventory. Ideally, this institution also contains a significant portion of the technical expertise needed to prepare the inventory. The Agency shall perform this function on the basis of the EPA Act, Act 490, 1999. The Agency will have overall technical oversight on the inventory as well as coordinate its timely delivery on sustainable basis. As the national GHG inventory entity, the EPA will lead in the development of programmes and strategies, which will ensure long-term improvements in the inventory system. The dissemination and awareness creation of all inventory products will be the responsibility of the Agency within the inventory framework. Various departments within the EPA will be assigned different technical roles in the inventory.

#### **4.9.4 Office of the UNFCCC Focal Point**

The office of the UNFCCC Focal Point at the Environmental Protection Agency has been tasked within the Agency to act the inventory coordinator to oversee the entire inventory. The inventory coordinator is responsible for planning the overall preparation of the inventory (except the first task) and, as the inventory is prepared, provides overall coordination, management and technical oversight. The focal point has both technical and administrative capacity to function as the inventory coordinator. The inventory coordinator will report directly to the national inventory entity. The national coordinator will also be responsible for most of the activities planning phase. For instance, in consultation with the inventory team, the Focal Point will design and organize training and other capacity building programmes at different stages of the inventory. Where necessary the inventory coordinator shall make all requests for data, information and any other material deem important for the inventory on continuous basis on behalf of the task-groups. In addition, the office of the focal point shall manage all Memorandum of Understandings, contracts, and information agreements in a way that it facilitates efficient delivery of all contracts, data, tasks and agreements.

The Inventory Coordinator will create a schedule based on that due date and all the inventory preparation steps that need to be completed prior to, and after, the due date, taking into account the amount of time needed to complete each of those steps. Starting with the due date for the final version of the inventory, and based on a logical sequence of inventory preparation steps, the Inventory Coordinator will also work backwards to set the due dates for all the previous steps and then work forward to set the due dates for the subsequent steps. In the event that the inventory is undergoing review (internal or external) the coordinator will interface between reviewers and the inventory experts.

### **4.9.5 Middle-level Tier Institutions**

The middle tier institutions constitute the “inventory team” and will be responsible for the overall inventory preparation. The inventory team will include: inventory complier, the national documentation and archiving institution, uncertainty specialist, QA/QC coordinator and the generalist. The inventory team are representation government institutions that the operation ability to deliver the various aspect of the inventory which has been assigned to them on sustainable basis.

### **4.9.6 Energy Resources and Climate Change Unit (ERCCU), EPA**

A technically competent individual at the ERCCU at the EPA shall be assigned as the “inventory compiler” who reports directly to the coordinator and work as team with the middle-level institutions. The inventory compiler among other functions shall have operational responsibility for data and document management, which is critical to the long-term improvement of the inventory. In addition, the inventory compiler would act as the receiver of all the pieces of the inventory from task groups – all worksheets and text and would be responsible for putting the pieces together into one unified inventory document. The compiler would double as the generalist for the inventory. This implies that, the compiler will make sure that all the inventory activities, which border on issues such as decisions and choices to undertaken recalculation, key categories analysis, completeness and reporting are done in a way that is consistent with IPCC GPGs both at the level of the inventory and also at the sector level. As a generalist, the ERCCU will also make sure any new developments concerning the inventory are thoroughly discussed and implemented to the latter. The ERCCU must work closely with the sector generalist in order to make the sector inventory internally consistent.

### **4.9.7 QA/QC Coordinator – Mathematics Department, KNUST**

The new institutional arrangement proposes that a separate national entity be in charge of QA/QC activities both at the level of the inventory and sector in order to ensure improved quality in the inventory. The QA/QC coordinating institution shall ensure the full and sustained implementation of the QA/QC plan across the inventory spectrum. The QA/QC coordinating institution will have necessary competence, independence and preferably an academic institution. The Mathematics Department (MaD) of KNUST possesses the right skill set to see to the proper implementation of the QA/QC plan of the inventory. The MaD and inventory complier will together design and implement QA/QC plan, first at the level of the inventory. In addition, QA/QC coordinator is expected to coordinate all QA/QC activities at the sector in order to ensure its consistency with the overall QA/QC plan. The QA/QC coordinator will work close with the inventory complier and reports to the national inventory coordinator.

The scale of the QA/QC plan will depend on available resources. It is recommended that QA/QC procedures include, at a minimum, routine internal review procedures (e.g., spot-checking spreadsheets for correct data entry, consistent formulas and complete documentation) and at least one round of external peer review. The plan will state the minimum levels of QC that need to be met, as well as recommendations for more rigorous QC, all in line with international best practice and guidance, if sufficient resources are available. The plan should also include a schedule for QA procedures, lay out internal responsibilities (e.g., who will distribute materials for external review and will collect and disseminate review comments), contain a list of external reviewers and include instructions for incorporating and tracking revisions based on comments received.

### **4.9.8 National Documentation and Archiving (NDA) – Ghana Statistical Service**

The new institutional arrangement recognises documentation and archiving as one the effective ways of ensuring long-term improvement in the inventory and promoting transparency in the entire process. In fact the entire GHG inventory is going to be grounded on detailed documentation and storage of data, assumptions and choice of methodologies, estimate and reporting. Ghana Statistical Service (GSS) has the national legal mandate to archive all national data, thus the GSS shall be responsible for hosting the platform for documenting and archiving all inventory-related activities both at the inventory and sector levels. Documentation and archiving



are a crucial part of any sustainable GHG inventory effort. It is good practice to complete and archive full documentation for every inventory produced, so that each inventory is transparent, all inventories are consistent, and the next version of the inventory can be produced efficiently, even if the inventory changes. A new inventory team should not redo work that has already been done to prepare a previous inventory. In addition, full documentation and archiving may be necessary to justify the inventory work to political officials or the public. In addition, full documentation and archiving may be necessary to justify the inventory work to political officials or the public.

It is important to use a standardized documentation and archiving system for both numerical and qualitative information and to undertake documentation throughout the inventory preparation process. Documentation and archiving procedures, which will have been defined during planning will include standardized procedures for documenting spreadsheets and text sections (e.g., instructions for referencing, data sources in spreadsheets, instructions for describing methods and data and uncertainties in the inventory text), as well as procedures for dating files and for keeping paper and electronic copies of files, reference materials and other sources of data. In addition, the sector-task groups will do considerable documentation in the course of their respective inventories and later pass it on to the NDA through the inventory compiler who will make double back copies.

The group will compile:

- Complete descriptions of the data assessment and manipulation processes, including the sources of data that were evaluated,
- Why a particular data source was chosen for use in the inventory and why others were not chosen;
- What assumptions were made in manipulating or choosing data for final use;
- Complete references for the data;
- Why recalculations were made and what those recalculations were; and
- Responses to internal and external review comments.

Though this essential information may or may not be included in the final report, it is important that they are collected in a consistent manner for purposes of later reference or in any format and archived with other inventory materials. Sector task group members will be required to complete the documentation-tracking log for onward transmission to the lead-task institution.

#### ***4.9.9 Uncertainty Specialist – Department of Statistics, University of Ghana***

Under Decision 17/CP.8, non-Annex I Parties are encouraged to provide information on the level of uncertainty associated with inventory data and their underlying assumptions, and to describe the methodologies used, if any, for estimating these uncertainties. It is important that Parties develop and report qualitative and, if possible, quantitative estimates of uncertainty as part of their GHG inventories because such information can help prioritize efforts to improve the accuracy of inventories in the future and guide decisions on methodological choice. In the next cycle of the GHG inventory and any subsequent ones, Ghana will endeavor to execute uncertainty assessment and management for the entire inventory and at least for the key categories (gases and sectors). The new institutional arrangement proposes that a separate competent institution preferably with statistic orientation be tasked to coordinate the uncertainty activities. We propose that the Department of Statistics (DoS) at the University of Ghana lead this activity. DoS will work closely with the inventory compiler and the various lead task group institutions.

#### 4.9.10 Sector-level Institutions (Based on IPCC Sectoral groupings)

The sector-level institutions will undertake actual computation of GHG estimates for five sectors including energy, industrial processes, agriculture, land use change and forestry and waste. The sector-level institutions will prepare the inventory calculation spreadsheets and the inventory text sections using the IPCC software and other software where necessary. The GHG estimate for each sector will be produced under the guidance of the lead-task institutions that also have oversight responsibility. The lead-task institutions, the sector generalist, the QA/QC and uncertainty management institutions for the sector will make sure that various crosscutting issues, which are specific to the sector, are implemented in a manner, which is consistent with the overall inventory procedures. In all, the representative from the ERCCU of EPA will act as the generalist for all the sectors.

#### 4.9.11 Agricultural Sector

The inventory in the agricultural will be undertaken by the task-group on Agriculture, which will be led by the Crop Service Department (CSD) under the Ministry of Agriculture. The CRD shall be directly responsible for the actual planning, preparation and reporting of the process emissions with ERCCU of EPA as the generalist. The Agriculture task group will be made of representations from Animal Research Institute, CSIR, Savannah Agriculture Research Institute (SARI) and Soil Research Institute (SRI). QA/QC and uncertainty will be provided by the Crop Research Institute. In addition to this, several potential data sources for the sub-categories as have been identified.

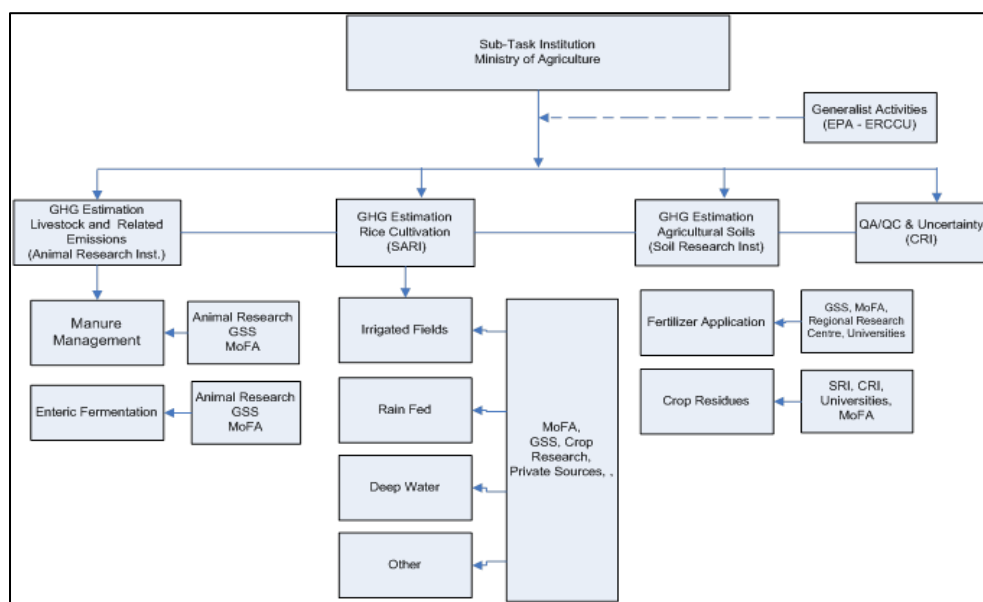


Figure 4-7: Institutional arrangement for the Agricultural Sector

The agricultural sector emissions inventory activities have been divided into four parts and each institution in the task group will lead a specific task. The division and the allocation of tasks are influenced by the fact that unique position of the lead institution to be able to deliver the tasks because its capacity. The emissions activities have been divided into three (domestic livestock, rice cultivation and agricultural soils) in addition to the QA/QC and uncertainty activities for the sector. For each of the sector inventories, potential data sources have been identified in the institutional arrangement above. For instance, under the GHG emission inventory for domestic livestock, the group could source data from the Animal Research, Ministry of Agriculture, GSS and the various private entities. Following completion of the estimate, the CSD as the lead-task institution has the responsibility to review and submit the sector workbooks and text to the inventory compiler for further analysis and synthesis.

#### 4.9.12 Land Use Change and Forestry (LUCF) Sector

The inventory in the LUCF will be undertaken by the task-group on LUCF, which will be led by the REDD+ Secretariat (Climate Change Unit), Forestry Commission. The REDD+ Secretariat shall be directly responsible for the actual planning, preparation and reporting of the processes of emissions with ERCCU of EPA as the generalist. The LUCF task group will be made of representations from College of Agriculture and Natural Resource, KNUST and RSMC and Soil Research Institute (SRI). QA/QC and uncertainty will be provided by the Forestry Research Institute. In addition to this, several potential data sources for the sub-categories as we have identified.

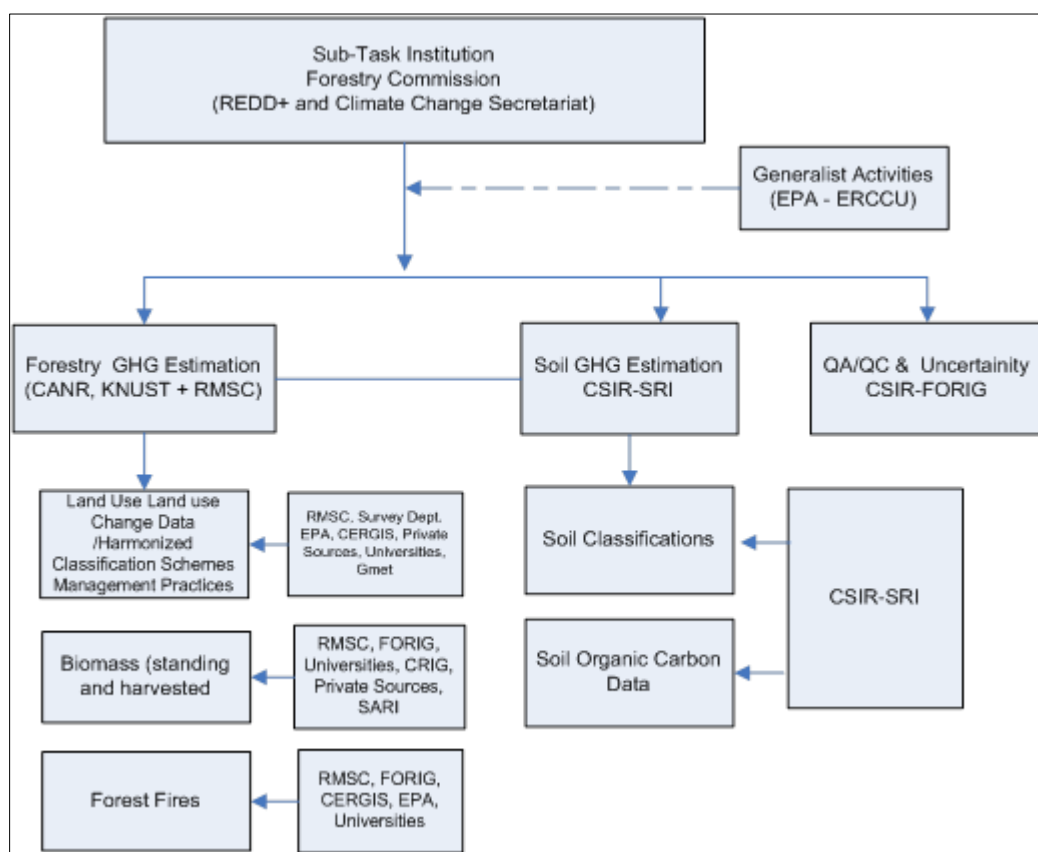


Figure 4-8: Institutional arrangement for the LUCF Sector

The LUCF sector emissions inventory activities have been divided into three parts and each institution in the task group will lead a specific task. The division and the allocation of tasks are influenced by the fact that unique position of the lead institution to be able to deliver the tasks because its capacity. The emissions activities have been divided into two (forestry emissions and agricultural soils) in addition to the QA/QC and uncertainty activities for the sector. For each of the sector inventories, potential data sources have been identified in the institutional arrangement above. For instance, under the GHG emission inventory for forestry, the group could source data from Survey department, EPA, CERGIS, RMSC, SARI, FORIG and the various private entities. Following completion of the estimate, the REDD+ and Climate Change Secretariat as the lead-task institution has the responsibility to review and submit the sector workbooks and text to the inventory compiler for further analysis and synthesis.

## 4.10 Sustainability Issues and Strategies for Mainstreaming

The inventory system in Ghana has experienced substantial improvements since the initial national communications. Yet more need to be done to achieve considerable rigor and robustness. In view of the fact that the existing institutional arrangements for the inventory is fragile and lacks adequate continuity, with substantial gaps in data management, funding, as well as capacity development and retention, it is imperative that concrete mechanisms and systems are put in place, in order to ensure a more sustainable inventory regime for the country, which is capable of responding to current and emerging requirements for National Communications and GHGI.

### 4.10.1 Data Management

The establishment of a national system for creating a GHGI was triggered by the reporting obligations of Ghana to Articles 4 and 12 of the Framework Convention on Climate Change. The GHGI system in Ghana defines the institutional set-up and measures for legitimate data collection, collation and archiving. The institutional set-up includes government and private institutions as well as third party entities.

The processes for implementing the national GHGI is iterative and evolving over time. One aspect that has seen major improvements over the years is the increasing institutional awareness of the inventory obligations of Ghana. It is worth noting that the entire institutional set-up for the GHGI would need to be improved in terms of robustness and adaptability. Enhancement of the existing institutional set-up for GHGI is necessary if Ghana should meet the increasing demand for high quality and accurate emission dataset by climate change mechanisms.

Effective data acquisition and management for GHGI inventory is a major challenge to the estimation of quality GHGI in Ghana. Generally, activity data exist in different forms and degrees of uncertainty. Country-specific data on emission factors are not available for almost all sectors except the transport category of the energy sector. This results in wide use of default values (mainly emission factors) from IPCC guidelines and thus contributes to a major source of uncertainties in GHGI. The existing inventory data are also saddled with varying levels of quality across sectors; additionally some of the required data do not exist. Unavailability of data is a challenge normally encountered during inventory compilation.

Data providers usually restrict access to information because data might be confidential, unpublished or not yet finalized. Data is usually collected by organizations (data providers) for official work and not purposely for inventory work. Verification and cross checking of data is a challenge in some sectors. For example, in the industrial processing sector, the industries are the sole generators of the data and they do not publish their data. Generally, data providers are the owners of the data they generate. Data is usually archived in the respective agencies (Data Providers) either in soft or hard copy and in some instances data is available online. Most often data providers do not have the capacity for portal archiving and normally lose track of data archived over some period of years. Because data generation involves cost, owners more often raise issues of data rights, data protection and extent of sharing.

The following gaps have been identified in the national emission data collection process and the institutional arrangement and systems for GHGI in Ghana:

- Emission data collection in Ghana is “on demand”. Thus there is no obligation on the part of data providers to submit periodic returns to EPA and the designated the national emission data coordination centre.
- Inadequate data management system for GHG inventory in Ghana. GHG data archiving and dissemination in Ghana is largely inadequate.
- Insufficient capacity in the practices of collecting national GHG inventory data. Methodology is not in line with EPA/UNFCCC requirements, as raw data is not purposely collected for GHG inventory work. This

affects the quality of quantitative assessment of the inventory in the key categorical sectors in Ghana. Available data is not properly collected and formatted for the purpose of GHGI in Ghana.

- Lack of country-specific emissions factors. With the exception of the transport sector, there is no national emission factor for the other sectors such as energy, agriculture and LULUCF. As a result, IPCC default factors are used to estimate emissions in Ghana.
- National data in some category sectors is not readily available. Waste data is mainly available in only the metropolitan and municipal areas.
- Need for rigorous and transparent studies on future emissions trends in Ghana.

Given these challenges in data generation, usability for GHGI and access by the inventory team, it is important that adequate channels are developed for a more sustainable data generation and sharing framework. This framework should go beyond personal arrangements and solidarity, to one that is grounded in statutory requirements, memoranda of Understanding (MoU), institutional mandates and possibly legal structures.

For instance, the EPA has a legal backing (ACT 490), which mandates it to demand environmental impact assessments, environmental management plans and reports of operations of factories and industries in the country. This could be a good avenue to access much needed data, in a manner that can be swift and responsive. In some other instances, data providers could be outside the mandate of the EPA, hence the ACT cannot be used as a basis to source for information, however, appropriate channels could be used to settle on MoU's which will be binding with adequate provisions to ensure that both parties get satisfaction and good delivery. It is important to note that the proposed national system is an effort to improve on the estimation of Ghana's GHGs; hence this exercise targets efficient mechanisms that will result in a sustainable channel for data generation and sharing. This also means that as much as existing mandates and agreements between data providers and the inventory office is a matter of necessity and subjected to various terms and conditions, there should also be an opportunity for new legislations to be enacted to give much stronger backing to data acquisition issues for the inventory. Thus, all options should be pursued to get adequate information and estimation of the Ghana's GHG emissions and removals, which is a COP decision.

Another overarching issue around data for the inventory borders on quality and format of presentation. This is a huge challenge given that most data owners generate the data with very little or no intention for possible use for GHGI. Hence, the new national system has been designed such that the GHGI will be perceived more as a national activity with benefits for national development, rather than the hitherto perception that it is EPA's activity. This also means that with the decentralization of the whole inventory exercise, most institutions and data providers will be much closer to the inventory and expected to open up channels for improvements in the quality and format for the generation and presentation of data. However, as much some data is being generated which have use in the current inventories, there is a huge data vacuum which needs to be filled, coupled with the need to move beyond tier one methodology. Hence systematic efforts should be evolved which will ensure that data needs for the inventory are identified and generated.

#### **4.10.2 Capacity Development and retention**

It is very clear that efforts have been made to expand the institutional arrangements for the GHGI. This is a targeted approach to make the national system as well as the estimates more robust, efficient and sustainable. It is also a fact that few people have been involved in the inventory regime, based on several factors, prominent of which is capacity and technical know-how. The estimation of the inventory and its compilation is a very technical exercise which is only familiar to few people, with the development of the new national system, serious capacity gaps and capability to deliver outputs that are required for the inventory will come into play. Invariably, most of the institutions which have been included in the new national system have very little or no idea about the modalities for estimating and reporting data for the GHGI.

Though these institutions may have related activities, in terms of core duties, availability of some level of capacity and facilities which could be best harmonized in an efficient national system, there is the need for concrete plans to build and improve on their technical capacity. This capacity building plan should be streamlined along the specific gaps and envisaged or assigned roles in the new national system. The training should also be targeted at dedicated staff who have the interests to work on inventory, with alternative staff options as back-ups should there be the need to transfer tasks or in the event that the main contact person

cannot play his/her role. This is to ensure continuity and smooth transfer of duties. There should also be modalities to evolve a training schedule in the universities to ensure a build-up of the number of experts in the estimation and the whole inventory regime. For instance, aspects of the data requirements for the inventory could be research topics for students, and could serve as training opportunities in the estimation of GHG. This background could eventually translate into a much more concrete capacity development system, with a pool of expertise to undertake assignments at different levels of the inventory.

It is also important that adequate incentives are provided to people involved in the new national systems, so as to ensure that their capacities are retained over a much longer duration. This is also to ensure that people do not move from their institutions to other organizations to apply the knowledge that has been gained due to their involvement in the inventory. It is also in the spirit of ensuring sustainability and continuity.

### **4.10.3 Funding and financial sustainability**

Funding is a core issue and critical lifeline in the inventory. In spite of the fact that the country has successfully produced two GHGI's in the past years; these have been achieved under limited funding conditions. Under the current institutional arrangements provisions are only made for expenses of very limited activities, with inadequate funding for data collection and archiving, while most levels of the estimation and compilation being done by frontline estimation staff. Though GEF has been mandated under the UNFCCC to provide funding for the inventory, this source of funding has largely been inadequate to fulfill some parts of the activity, hence ad-hoc arrangements are made in order to ensure that the estimation and compilation is achieved.

A critical component for the sustainability of the new national system for GHGI will be adequate funding and logistical provisions to ensure that there is direct chain and linkage from one stage to the other. Given that the institutions involved in the inventory have been broadened, there will be the need to adequately resource in them to effectively carry-out assigned roles. Also, with indications pointing to a much more frequent reporting regime and the need to move to higher tiers of estimation, it is important to put in sustainable modalities to source for data, ensure that data providers are adequately positioned to generate the right data as well as presented in the required formats which will enhance the estimation.

It is also worthy of note that, as much as the core funding of the inventory will be expected from GEF or related institutions, it is important to explore national provisions and budget lines captured under climate change activities associated with the mandates of the agencies and institutions involved in the inventory. This will ensure that the sustainability of the inventory is adequately mainstreamed into the regular activities of the participating institutions. It is also important that the inventory is seen as part of the national development strategies and also as an obligation to the UNFCCC, hence, the need to constantly address erroneous perceptions that the assignment of roles to new institutions could be new activities and projects, which are external to the regular functions of the participating institution.

### **4.10.4 Mainstreaming**

The new institutional arrangements are practically meant to institutionalize the GHGI, make it more responsive in terms of data sharing and acquisition and ensure improved estimates. Therefore, each institution in the new arrangement was assigned roles based on their known mandates and functions, which directly relate to aspects of the inventory regime. Thus, the new institutional arrangement is a deliberate task to mainstream Ghana's GHGI into existing structures in the public and civil service, as well as private and international organizations with expertise that can be used to harness and improve on the estimation.

As much as the new institutional arrangement is an attempt to institutionalize the inventory, it is also a means to utilize the existing structures to ensure that efforts are not duplicated by acquiring facilities which already exist. For instance the Ghana Statistical Service (GSS) serves as the national portal for data storage and management, among other duties. This facility feeds very well into the management phase of the inventory where data is expected to be stored and archived for future utilization. Hence instead of creating facilities and keeping this information at the EPA, as is being practiced now, the facilities at GSS can easily be adapted to serve as a central depository of data and information around the inventory.



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