Forest Carbon Partnership Facility (FCPF)

Carbon Fund

Emission Reductions Program Document (ER-PD)

ER Program Name and Country: *Mai-Ndombe Emission Reductions Program, Democratic Republic of Congo*

Date of Submission or Revision: *November 8th 2016*

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ACRONYMS

A/R	Afforestation / Reforestation
CAFEC	Central Africa Forest Ecosystems Conservation
CAFI	Central African Forest Initiative
CART	Territorial Agricultural Rural and Management Council
CBFF	Congo Basin Forest Fund
CCBA	The Climate, Community & Biodiversity Alliance
CDM	Clean Development Mechanism
CDF	Congolese Franc – (1US$ equivalent to 927,6 CDF – 2016.01.31)
CIRAD	Agricultural Research Centre for International Development)
LDC	Local Development Committees
CSO	Civil Society Organizations
CTB	Belgian Technical Cooperation
CTR	Technical Committee for Reform Monitoring and Evaluation, Ministry of Finance
DGM	Dedicated Grant Mechanism
DGRAD	Directorate-General of Administrative, Judicial, State Land and Share Charges of the DRC)
DIAF	Department of Forest Management and Inventories
DTE	Decentralized Territorial Entities
DVI	Department of Internal Control and Audit
ER	Emission Reductions
ERA	Ecosystem Restoration Associate
ERC	Emission Reduction Credits
ERPA	Emission Reductions Payment Agreement
ERPD	Emission Reductions Program Document
ER-PIN	Emission Reductions Program Idea Note
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan

FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FGRM	Feedback and Grievance Redress Mechanism
FIB	Wood Industries Federation
FIP	Forest Investment Program
FLEG	Forest Law Enforcement and Governance
FLEGT	EU Initiative on Forest Law Enforcement, Governance and Trade
FPIC	Free, Prior and Informed Consent
GHG	Greenhouse Gas
GI-Agro	Groupe d'Initiatives pour l'Agroforesterie en Afrique (Agroforestry Initiative Group for Africa)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Agency for International Cooperation).
GPRSP	Growth and Poverty Reduction Strategy
GTCR	Working Group on Climate and REDD+
HFLD	High Forest Cover Low Deforestation
HPP	Human People to People
ICCA	Indigenous Pygmy Peoples' and Community Conserved Areas
ICCN	Institut Congolais de la Conservation de la Nature (Congolese Institute for Nature Conservation)
ICRAF	International Centre for Research in Agroforestry
IFAD	International Fund for Agricultural Development
IMO	Independent and Mandated Observer
IPP	Indigenous Pygmy Peoples
JNR	Jurisdictional and Nested REDD+
JICA	Japanese International cooperation agency
KFW	*Kreditanstalt für Wiederaufbau* – German Development Bank
LDC	Local Development Committee
LEA	Local Executing Agency
MECNDD	Ministry of Environment, Nature Conservation and Sustainable Development
MF	Methodological Framework of the FCPF Carbon Fund
MINAGRI	Ministry of Agriculture of the DRC
MRV	Measuring, Reporting and Verification
MPTF	Multi-Partner Trust Fund

CN-REDD	National REDD+ Coordination
NGO	Non-Governmental Organization
OGF	Forest Governance Observer (a NGO)
OSFAC	Organisation Satellitale des Forêts d'Afrique Centrale (Satellite Observatory for the Forests of Central Africa)
PES	Payment for Environmental Services
PIREDD	Integrated REDD+ Project
R&D	Research & Development
RCI	REDD+ Climate Initiative
RCWG	REDD+ Climate Working Group
REDD+	Reducing Emissions from Deforestation and Forest Degradation
REL	Reference Emission Level
REPALEF	Réseau des populations autochtones et locales pour la gestion durable des écosystèmes forestiers (Network of indigenous and local populations for the sustainable management of DRC forest ecosystems)
SDD	Sustainable Development Department of MECNDD
SDP	Sustainable Development Plans
SES	Social and Environmental Safeguards
SESA	Strategic Environmental and Social Assessment
SIS	Safeguards Information System
SNV	Dutch Development Organization
UCL	Université Catholique de Louvain (Catholic University of Louvain)
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States International Agency for Development
USFS	United States Forest Services
VCS	Verified Carbon Standard
VPA-FLEGT	Voluntary Partnership Agreement - Forest Law Enforcement, Governance and Trade
WRI	World Resources Institute
WWC	Wildlife Works Carbon
WWF	World Wide Fund for Nature

MAI NDOMBE EMISSION REDUCTIONS PROGRAM DOCUMENT EXECUTIVE SUMMARY

SNAPSHOT

The Government of DRC views the Mai-Ndombe Emission Reductions (ER) Program as a first step in implementing the country's national REDD+ strategy at jurisdictional level, as a model for green development in the Congo Basin, an important test of climate action on the African continent and for REDD+ results-based payments in HFLD countries. The ER Program is a unique opportunity to secure long-term public and private finance for delivering on the Paris Agreement's goal and sustainable development.

Program goal: The ER Program aims at implementing the country's green development vision at scale by providing alternatives to deforestation and rewarding performance to address the challenges of climate change, poverty reduction, natural resource management and protection of biodiversity.

Jurisdiction: Mai-Ndombe province, Democratic Republic of Congo

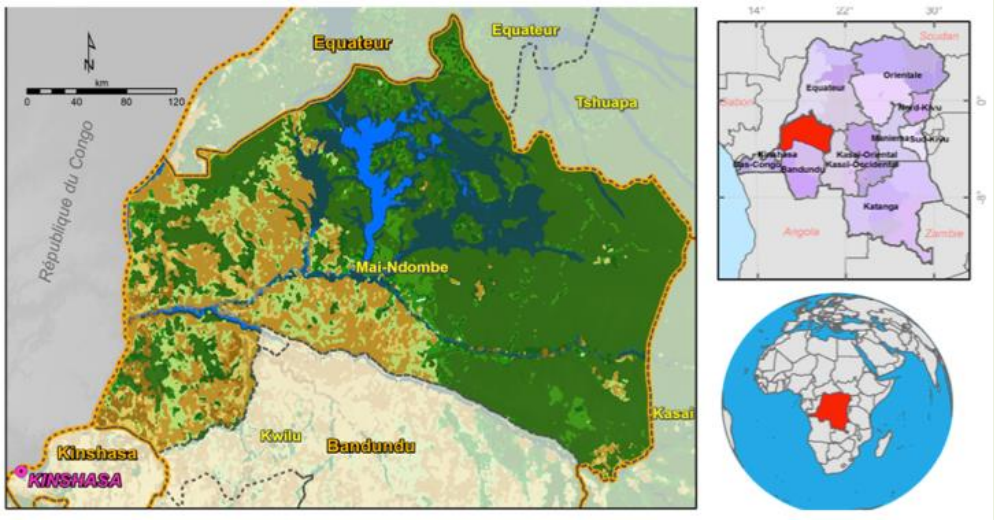
- 12.3 million hectares total area
- 9.8 million hectares of forest

Duration: The program has a long-term perspective of 20 years with an ERPA period of 5 years (2017 – 2022)

CO_2 Reductions: 29 million tCO_2 estimated to 2021

Budget: USD 80 million of up-front investment finance and a potential of results-based payments for 29 million tCO_2 over 5 years

The Proposal is for the Forest Carbon Partnership Facility (FCPF) Carbon Fund to sign an Emission Reduction Payment Agreement for 15 million tCO_2.



CONTEXT AND AMBITION

The Democratic Republic of Congo (DRC) is a key player to address global deforestation and mitigate climate change. The country has the second largest swath of rainforests in the world—152 million hectares, accounting for most of the remaining rainforest in the Congo Basin. Although rates of deforestation in the DRC are low compared to tropical forests in the Amazon and Southeast Asia, almost half a million hectares are lost each year. As one of the least developed countries (LDC) in the world, economic development is a top priority and the country's forests are under increasing threat. Representing a High Forest Cover and Low Deforestation (HLFD) country, DRC is at a critical juncture. Keeping deforestation rates low in HFLD countries is one of the main strategies in the forest and land use sector to deliver on the Paris Agreement's goals to limit temperature increase to well below 2°C and to pursue efforts to limit increase to 1.5°C above pre-industrial levels.

The Government of DRC is committed to implementing this objective through a low carbon development pathway including REDD+. It views the environment and efforts to combat climate change as one of the strategic areas of its national policy and submitted to the UNFCCC an Intended Nationally Determined Contribution (INDC) on mitigation that presents specific emission reduction goals for the land sector including reducing deforestation, increasing reforestation, and improving agricultural practices. In particular, the DRC Government is committed to slowing, and eventually halting, forest loss. In 2012, it adopted a National REDD+ Strategy, which illustrates a vision for how a country can meet its long-term development aspirations through a green economy. The strategy aims to stabilize forest cover on two–thirds of the country's land area by 2030 and maintain it thereafter. The DRC has been engaging in and championing the REDD+ process since 2008 and has developed a large-scale REDD+ program for result-based payments in the Mai-Ndombe Province to deliver significant climate impact, critical development benefits and unprecedented learning for the FCPF Carbon Fund. The country was one of the first to submit an Emission Reduction Program Idea Note (ERPIN) in April 2014 and the first to present a Readiness-Package in May 2015. The design of the Emission Reductions Program Document (ERPD) for Mai Ndombe has progressed over a period of nearly two years in close and frequent consultation with local, national and international stakeholders, including civil society and Indigenous Pygmy Peoples.

The ambition of the Mai-Ndombe ER-Program is to implement a model for green development at provincial level that provides alternatives to deforestation and rewards performance to mitigate climate change, reduce poverty, manage natural resources sustainably and protect biodiversity. The program is designed to combine different sources of funding, such as the Forest Investment Program (FIP), the Congo Basin Forest Fund (CBFF) and the Central African Forest Initiative (CAFI), and to leverage private funding to scale up pilot activities and support the shift of a land use trajectory at large scale.

Consultations and information in the design phase of the Mai Ndombe ER Program has taken place at multiple levels. Beyond the extensive consultations in the context of the REDD+ readiness process, significant efforts have been undertaken to inform and consult local stakeholders in Mai Ndombe (Indigenous Pygmy Peoples, local communities, civil society organisations, decentralized administration, companies) through meetings in every territory, outreach activities and trainings in the capitals of the former as well as the new province (Bandundu Ville and Inongo).

DRIVERS AND UNDERLYING CAUSES OF DEFORESTATION AND FOREST DEGRADATION

The main direct drivers of deforestation and forest degradation in the program area are slash-and-burn agriculture, fuelwood production, uncontrolled bush fires, artisanal logging and industrial logging. The underlying reasons for these drivers are population growth, poverty, the absence of economic and technical alternatives, poor management of natural resources, and unregulated land tenure. These direct and indirect drivers constitute strong trends towards increased pressure on forests. The Mai-Ndombe Province is located at the frontier of the Kinshasa supply basin for agricultural and wood products and the

primary forest of the Congo Basin. Agricultural production is the main source of income for 90% of the households in the province. Cassava and maize are the main cash crops sold primarily to Kinshasa and Mai-Ndombe has become an important source of charcoal supplies for Kinshasa as a result of the depletion of the forests of the Lower Congo between 2000 and 2010. This pressure on Mai Ndombe's forest resources will continue to be exacerbated as demand from Kinshasa rises and the surrounding forests shrink. Moreover, the demand for slash-and-burn farming land is significant (if unsuitable or occupied land is excluded the remaining forested area represents approximately 46% of the province's total area). With a population growth rate of 3% it is estimated that in approximately 33 years the non-concession and non-flooded forests of Mai-Ndombe will be totally lost to agriculture.

INTERVENTION STRATEGY AND PROGRAM ACTIVITIES

To be transformational, the program is designed to provide a balanced combination of (i) enabling activities, such as strengthening governance, capacity building, local level land-use planning, and securing land tenure, and **(ii) sectoral activities**, such as improved agricultural practices, reduced impact logging, agroforestry, fire management and charcoal production. The operationalization of a green development model means for the province to offer a sustainable supply of fuelwood, lumber and agricultural products for the megalopolis of Kinshasa while at the same time increasing the incomes of the local population and maintaining significant forest cover.

More specifically on the set of sectoral activities, the program strategy is geographically adapted and involves a land-use planning process centred on the sustainable development of natural resources. This includes (i) offsetting the demand for unsustainable wood products from the province-city of Kinshasa with reforestation and regeneration activities on savannah lands and along the river, in particular in the district of Plateau, (ii) orienting agricultural production in the forest towards practices that are less land-consuming than fallow-slash and burn farming, such as perennial crops and agroforestry (iii) incentivizing the conservation and sustainable management of forests.

A summary of the program's activities in line with the seven pillars of the national REDD+ strategy is provided in the following table:

Pillars	**Sectoral activities**	**Enabling activities**
Agriculture	Agroforestry and improvement of cultivation techniques Perennial crops development in non-forest areas (coffee, cocoa, palm oil and rubber)	Strengthening agricultural value chains
Energy	Assisted natural regeneration for charcoal production Afforestation/Reforestation for charcoal production	Formalization and strengthening of the fuelwood sector
Forest	Reduced impact logging Conservation of local community forests Conservation concession Afforestation/Reforestation for lumber production	Strengthening forest and wildlife law enforcement Legal compliance of industrial logging operations Development of community forestry Support management of protected areas

Governance, demography, land planning and tenure	Capacity-building of decentralized State services Multi-level capacity-building and Sustainable Development Plans design Implementation of collective and strategic facilities Family planning

REFERENCE EMISSION LEVEL

The Reference Emission Level (REL) is calculated based on average annual emissions for the period 2004-2014 and is including an upward adjustment (per FCPF eligibility requirement).

Activity data have been calculated based on manual classification of sampled remotely sensed imagery, consistent with IPCC Approach 3 techniques, which uses an intelligent filter to recognize and ameliorate potential land-use transition anomalies.

Emission factors have been established based on Carbon stock data developed under the Carbon Map and Model program, by a Light Detection and Ranging (LiDAR) flight campaign in the ER program area.

The Reference level for the Mai-Ndombe ER-Program is estimated at 48 Million tCO2/year.

ER Program Reference Level	Annual Emission/ Removals (tCO2/yr.)
Average annual historical emissions from deforestation	24,651,957
Average annual historical emissions from degradation	18,838,100
Average annual historical removals from enhancement of carbon stocks	-1,424,990
Adjustment	5,611,789
Total Reference level	**48,022,794**

POTENTIAL EMISSION REDUCTION

The Emission Reduction potential of this ER-Program have been estimated on the basis of the existing strategy and current funding level. (See section 13). The following table present the Gross ER ex-ante estimation per activities.

Considering the set-aside of ERs to address reversal and uncertainty risk, **the ER-Program may generate 29 million net emission reductions during the term of the ERPA.**

ER ex-ante estimation per activities

	Wood-oriented plantation and regeneration	Agriculture-oriented plantation	Community conservation	Conservation concession	Reduced impact logging	Total Gross ER (tCO2/year)
2017	998,334	527,625	146,158	1,500,000	54,000	3,226,117
2018	1,988,465	900,406	292,316	1,743,650	108,000	5,032,837
2019	3,516,277	1,381,639	605,600	1,743,650	162,000	7,409,166
2020	5,586,191	1,999,054	1,086,010	1,743,650	162,000	10,576,904
2021	7,852,518	2,621,773	1,684,826	1,743,650	162,000	14,064,766
Total	19,941,785	7,430,497	3,814,909	8,474,598	648,000	40,309,789
%	49%	18%	9%	21%	2%	

BENEFIT-SHARING

Beneficiaries of the REDD+ revenues will include participants with direct and indirect influence including legal or de facto managers of forest resources, actors in the different value chains of commodities as well as political and administrative stakeholders. Indigenous Pygmy Peoples will receive special recognition by the program according to the recognition of their historical role in sustainable forest management.

The benefit sharing arrangements will consider the origin of the up-front funding and the non-carbon benefits generated by the program revenues from the sale of Emission Reductions will be allocated through three windows in the benefit sharing plan:

Performance-based payments based on the amount of carbon not emitted or sequestered (Emission Reduction Credit) for forest concessions, conservation concessions and others actors willing to own directly the Emission Reductions titles;

Performance-based payments based on proxy indicators for carbon performance, such as the number of non-deforested, regenerated, or planted hectares, to communities, private companies, medium-scale farmers and other stakeholders;

Pooling of a share of the revenues for reinvestment in enabling and communities' sectoral activities, leverage of private finance and operating costs, including a risk management mechanism for the case of under-performance of the program.

An indicative benefit-sharing plan is provided in the ERPD and will be reviewed in the context of the further ERPD development and ERPA negotiations

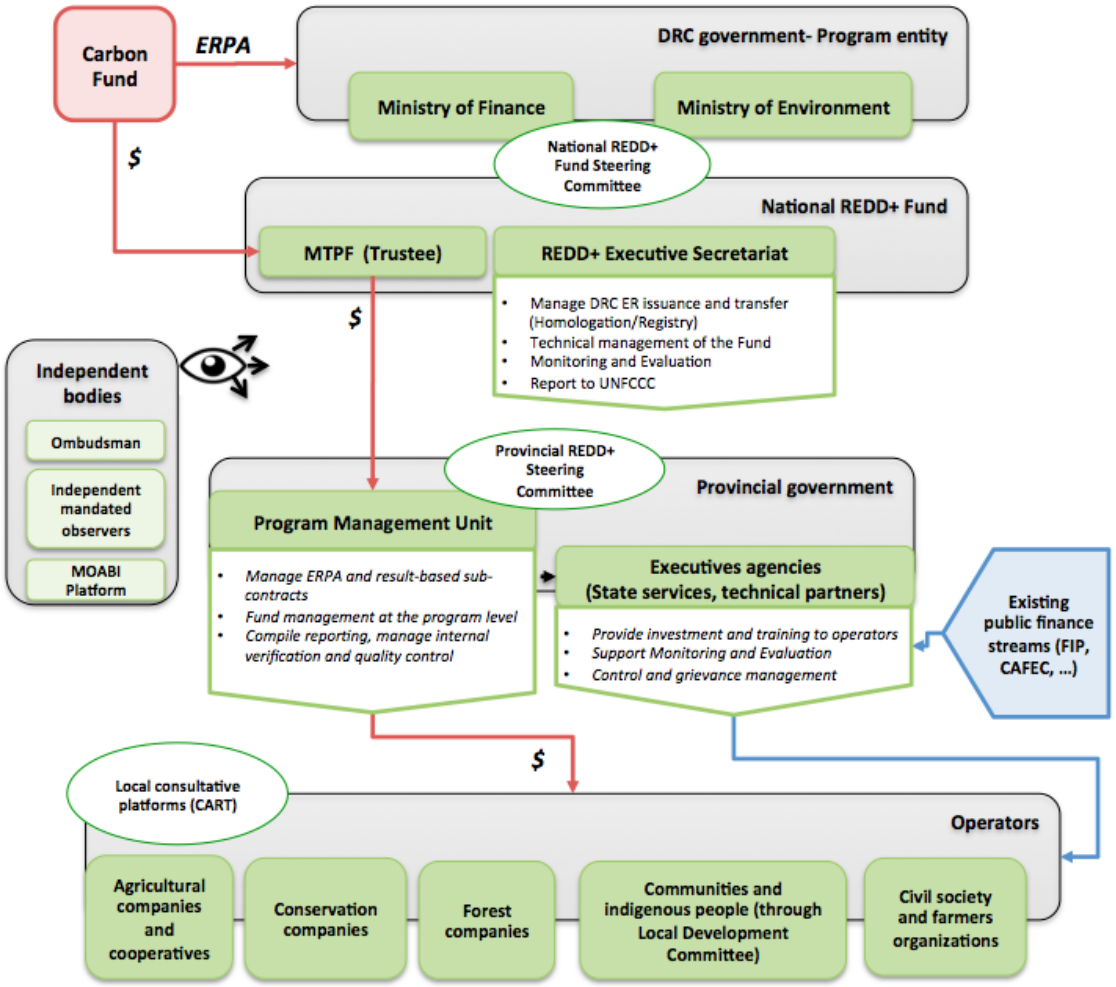
Beyond the revenues from sale of Emission Reductions, the program will increase household incomes and deliver socio-economic investments, such as roads, agricultural storage facilities and other infrastructure, on the ground. It will also catalyse private investments in the jurisdiction, reinforce good governance, for example tenure security, law enforcement, participation and transparency, and produce environmental co-benefits, such as biodiversity and soil fertility.

IMPLEMENTATION AND MONITORING ARRANGEMENTS

The institutional arrangements for the Mai-Ndombe ER program are designed to be in line with the most recent developments of DRC's REDD+ process, namely the ongoing operationalization of the National REDD+ Fund. This includes the establishment of a National REDD+ Fund Steering Committee and a REDD+ Executive Secretariat.

The Government of DRC, through the Ministry of Environment, Nature Conservation and Sustainable Development and the provincial government of Mai-Ndombe, will be the signatory of the ERPA.

At the national level, the Ministry of Environment and the Ministry of Finance will co-pilot the REDD+ process and the National REDD+ Fund through the National REDD+ Fund Steering Committee and its technical body; the Executive Secretariat.



The provincial government of Mai Ndombe is the main agency responsible for the program implementation and will be technically supported by the **Program Management Unit.** While the provincial government's role is focused on steering and policy coordination, the Program Management Unit will oversee the day-to-day management of the program, including administrative and financial management, FCPF advance payment management, carbon and non-carbon monitoring and reporting of the program, and management of the performance-based contracts with the operators. It will also be the interface with the Carbon Fund. This unit will be a firm with a track record and recognized skills. The Program Management Unit will work closely with the provincial government and build its capacities with the perspective of transferring the program management functions to the provincial administration in the medium term.

The provincial government will furthermore be supported by the Provincial REDD+ Steering Committee, which will include representatives from all ministries, civil society, Indigenous Pygmy Peoples, private sector, and the different executing agencies involved in the implementation of the ER program. The Committee will oversee reviewing and approving work proposed by the Program Management Unit (e.g. approve sub-contracts, work plans and budgets, validate monitoring reports) and provide strategic and policy directions).

Program activities on the ground will be implemented **by various operators, such as communities and Indigenous Pygmy Peoples, civil society and farmer's organization, and companies involved in logging, conservation and agriculture.** These operators will be supported and accompanied by local executing agencies and decentralized State services.

The monitoring and evaluation of the program will be structured mainly around the production of two progress reports: First, a monitoring report on the emission reductions will trigger payments by the Carbon Fund and other emission reduction purchasers. This report will also be the basis for performance-based payments defined in contracts with the operators. Second, a monitoring report on safeguards and non-carbon benefits will compile information of impact studies and compliance with safeguard measures when necessary. The institutions responsible for monitoring and evaluation of the program include the Directorate of Inventory and Forest Management (DIAF), local consultative platforms (CART and LDCs), independent mandated observers and independent auditors and verifiers.

SOCIAL AND ENVIRONMENTAL RISKS MANAGEMENT

The ER Program's intervention strategy has been developed in alignment with the National REDD+ Strategy Framework and has considered **the recommendations resulting from the Social and Environmental Strategic Assessment (SESA) process and national Environment and Social Management Framework (ESMF)**.

The DRC has also defined its National Social and Environmental Standards to put in place its own national regulatory framework and ensure the integration of social and environmental considerations in the implementation of REDD+, in full compliance with the Cancun Safeguards. The program will apply these safeguards instruments during implementation and operationalize the risk management matrix that has been prepared. The management of social and environmental impacts of the program is fully integrated into the identification, design, monitoring, and evaluation of its activities. All projects/activities implemented by the program will need to comply with the requirements of the ESMF at every step of implementation.

The sound application of safeguards as well as the generation of non-carbon benefits[1] during the implementation of the program will be disclosed through the following channels: (i) regular information posted in the National REDD+ Registry (ii) a monitoring report on National Environmental and Social Standards and specific safeguards plan if relevant published annually (or bi-annually) and (iii) an independent report produced by civil society and based on independent observation mission. Roles and responsibilities are detailed in Annex 12.

To manage potential complaints and conflicts, a Feedback Grievance and Redress Mechanism (FGRM) is currently being designed and will be the responsibility of the Program Management Unit and the implementing agencies. From the middle of 2016, the FGRM will be tested and the national REDD+ registry will provide a transparent platform for filing complaints and monitoring their handling.

[1] National Social and environmental standards of the DRC describe both the minimum safeguard measures and the expected co-benefits of REDD+ activities, therefore this section has a lot in common with Section 9.2 on the approach toward providing information on non-carbon benefits.

A PARTNERSHIP AMONG:

DRC GOVERNMENT	PRIVATE SECTOR	CIVIL SOCIETY
	WILDLIFE WORKS, novacel, SOCALCO SPRL, ogf, IIASA International Institute for Applied Systems Analysis	GTCRR Groupe de Travail Climat REDD Renove

WITH THE FINANCIAL SUPPORT OF:

cbff Congo Basin Forest Fund – A global response to a global issue; CIF Climate Investment Funds; Programme ONU-REDD; Forest Carbon Partnership Facility; World Bank Group; Norad; USAID From the American People; Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit; kfw; Department for International Development; afd Agence Française de Développement; CTB; JICA

Further information:

Victor Kabengele wa Kadilu, CN-REDD abckab@gmail.com

1. ENTITIES RESPONSIBLE FOR THE MANAGEMENT AND IMPLEMENTATION OF THE ER PROGRAM

1.1 ER PROGRAM ENTITY THAT IS EXPECTED TO SIGN THE EMISSION REDUCTION PAYMENT AGREEMENT (ERPA) WITH THE FCPF CARBON FUND

Name of the entity	**Ministry of Environment, Nature Conservation and Sustainable Development(MECNDD)**
Type and description of the organization	Ministry in charge of environment, forestry and especially management of environmental services. The Ministry has overseen the REDD+ process since 2009. It ensures the coordination of REDD+ related activities through the REDD+ National Coordination. The ministry of environment signed the Letter of Intent with the Carbon Fund in June 2014.
Main contact person	*Mr Vincent KASULU SEYA MAKONGA*
Title/Function	General Secretary – UNFCCC Focal point
Address	*15 Papa Lleo Street, Kinshasa, Gombe*
Telephone number	*+243814510594/ +243999905957*
Email	*kaseyamak@yahoo.fr*
Website	*www.medd.gouv.cd*

1.2 ORGANIZATION(S) RESPONSIBLE FOR MANAGING THE PROPOSED ER PROGRAM

Name of the organization	**Provincial government of Mai-Ndombe supported by a Program Management Unit**
Type and description of the organization	**The provincial government of Mai-Ndombe** will be responsible of coordinating the implementation of the different activities on the ground

	and especially the management of the performance-based payment system. It will chair the provincial REDD+ Steering Committee that will be responsible to approve the orientation of the implementation and the working plans of the different executive agencies. The provincial government will be supported by a Program Management Unit hired by the Ministry of Environment. This unit will be responsible for the daily management of the program and will be based partly in the capital of the province of Mai-Ndombe (Inongo). It will be responsible for (i) administrative and financial management, (ii) Strategic and technical coordination, (iii) Carbon and non-carbon reporting and (iv) marketing of the program. (see Section 6.1 and Annex 8)
Organizational or contractual relationship between the organization and the ER Program entity identified in 1.1 above	The provincial government will be involved through an agreement protocol with the Ministry of Environment. The Program Management Unit will sign a service provider contract with the Ministry of Environment.
Main contact person	*Mr.Gentiny Ngobila*
Title/Function	*Governor of Mai-Ndombe province*
Email	*ngobila@gmail.com*

1.3 PARTNER AGENCIES AND ORGANIZATIONS INVOLVED IN THE ER PROGRAM

Name of the partner	Name of the contact person, telephone number and email address	Core capacities and role within the ER program
CENTRAL GOVERNMENTAL ENTITIES		
National REDD+ Steering Committee	To be defined	*National steering of the REDD+ process and of the National REDD+ Fund* *Members: Ministers of Environment, Finance, Planning, Land-use Planning, Agriculture, Mines, Water Resources and Electricity, Hydrocarbons, Land Tenure; representatives of the private sector and of civil society.*
National REDD+ Coordination (CN-REDD)/MECNDD	Victor Kabengele wa Kadilu, National REDD+ Coordinator abckab@gmail.com	*Coordinates the REDD+ process in the DRC and the design phase of the Mai- Ndombe ER program*
Sustainable Development Department (SDD)/MECNDD	Benjamin Toirambe, Director of SDD be_toirambe@yahoo.fr	*Responsible for the National Greenhouse Gas Inventory*
Department of Forest Management and Inventories (DIAF)/MECNDD	Sébastien Malele, Director of DIAF semalele@yahoo.fr	*Responsible for the national forest monitoring system*

Ministry of Finance, Technical Committee for Reform Monitoring and Evaluation (CTR)	Félicien Mulenda, CTR Coordinator and focal point for the FIP and National REDD+ Fund Fmulenda2000@yahoo.fr	*Focal point for monitoring the reforms under the economic governance matrix, including REDD+ reforms* *Focal point for the National REDD+ Fund*
Coordination Unit of the Forest Investment Program /MECNDD	Clément Vangu-Lutete, Coordinator of the FIP vangulutete@gmail.com	*Financial and administrative management of the Forest Investment Program (FIP)*
PROVINCIAL GOVERNMENTAL ENTITIES		
Provincial Government of Mai-Ndombe	Gentiny Ngobila – Governor of Mai-Ndombe province ngobila@gmail.com Guy Ipenga - Provincial REDD+ focal point ipangaguy@gmail.com	*Pilot the implementation in the province and president of the REDD+ Provincial REDD+ Steering Committee. Work closely with the program management unit and has a steering and political coordination role.*
Provincial REDD+ Steering Committee	To be defined	*Provincial steering of the program, approval of the work plans and budgets for the program, validation of monitoring reports* *Members: Ministries (Agriculture, Environment, Energy, Health, Land-use Planning, Land Tenure), territorial administration, decentralized agencies, the provincial REDD+ focal point and representatives of the private sector, civil society and local communities and Indigenous Pygmy Peoples.*
CIVIL SOCIETY		
Working Group on Climate and REDD+ (GTCR Rénové)	Guy Kajemba, kajembaguy@yahoo.com Joseph Bobia, jb.bobia@gmail.com	*Coordination of the participation of civil society in the REDD+ process and the ER-Program development, at national and provincial levels*
REPALEF (Réseau des populations autochtones et locales pour la gestion durable des écosystèmes forestiers)	Rigobert Mola,jr.mola@yahoo.fr Keddy Bosulu, bosulumola@yahoo.fr	*Coordination of the participation of Indigenous Pygmy Peoples representatives in the REDD+ process and the ER-Program development, at national and provincial levels*
DGM National Steering Committee& National Executing Agency	Kapupu Diwa Mutimanwa, cpndgmrdc@gmail.com	*Deliberative council. Decides on the annual DGM work plans and makes funding decisions on eligible community proposals*
WWF – DRC	Flory Botamba fbotamba@wwfcarpo.org Bruno Perodeau Bperodeau@wwfcarpo.org	*Program design and implementation partner and execution agency of the FIP PIREDD in the Plateau District*
Forest Governance Observer (OGF)	Essylot Lubala, essylot@yahoo.fr	*Independent observer of the FLEG process, mandated by the Ministry of Environment. Has worked since 2014 on the development of independent observation of the REDD+ process*
MOABI	Léo Bottrill, leobottrill@crowdcover.org	*Manages an independent collaborative mapping platform for independent observers and local civil society*
GI-Agro	Jean Lejoly jeanlejoly@gmail.com	*Supports several villages in South Kwamouth on the development of REDD+ activities (agroforestry, regeneration etc.)*
CARITAS CONGO Asbl	André Mathunabo amathunabo@caritasdev.cd Thadée Barega, barega_th@yahoo.fr	*Supports agricultural producer organizations in the Diocese of Inongo on the improvement of agricultural production, their structuring and support for the strengthening of economic capacities.*
PRIVATE SECTOR AND PROFESSIONAL ORGANIZATIONS		
Wildlife Works Carbon (WWC)	Bolambee Bwangoy-Bankanza jrbwangoy@wildlifeworks.com	*Program design and implementation partner, Mai-Ndombe REDD+ project holder approved by VCS and CCBA*

	Mike Korchinsky mike@wildlifeworks.com	
NOVACEL	Olivier Mushiete, olivier@mushiete.cd	*Company specializing in agroforestry techniques, processing and commercialization of agricultural products. Implements the NOVACEL REDD+ pilot project of South Kwamouth funded by the CBFF and is currently setting up an agricultural cooperative called GICET.*
Wood Industries Federation (FIB)	Gabriel Mola, President, gabrielmola58@yahoo.fr	*Network of industrial logging companies in the DRC*
SODEFOR	José Albano, jamt@sodefor.net Raphael Barbiche, gestion_durable@sodefor.net	*Forest company owner of 11 concession in the ER-Program area*
SIFORCO	Mateos Phillis, dgsiforco@siforco.com	*Forest company owner of 1 concession in the ER-Program area*
Maison NBK	Victor Ngla Mumume, victornbk@gmail.com	*Forest company owner of 1 concession in the ER-Program area*
Congo National Confederation of Agricultural Producers (CONAPAC)	Mutombo Simplice sarmutombo@hotmail.com	*Network of agricultural producers in Congo*
SOGENAC	Jean-Francois Van Braekel; vbk@vodanet.cd	*Director of a livestock concession in Bolobo and Mushie. Volunteer for the development of savannah and forest protection activities within this concession.*
SOCALCO company (Dewji International Group)	Rizwan Dewji rdewji@dewjiintl.com	*High-quality match manufacturing company based in Kinshasa; committed to developing agroforestry reforestation activities in the program area, to setting up an R&D centre and to introducing local wood processing activities in order to increase local employment and revenue generation*
PERMIAN Global	Peter Carr peter.carr@permianglobal.com	*Support for conservation programs focusing on carbon performance through existing conservation concessions and facilitation for the creation of new conservation concessions.*

FUNDING PARTNERS AND TECHNICAL SUPPORT		
Forest Carbon Partnership Facility (FCPF)	Daniela Goehler, Senior Carbon Finance Specialist and country focal point for DRC, dgoehler@worldbank.org	*Technical and financial support for the finalization of REDD+ readiness and for the design of the ER Program including preparation of the ERPD.*
Forest Investment Program (FIP)	Laurent Valiergue, Senior Forestry Specialist, lvaliergue@worldbank.org	*Technical and financial support for the implementation of the Forest Investment Program in DRC and particularly the Improved Forested Landscape Management Project (P128887) and the FIP Dedicated Grant Mechanism to Indigenous People.*
UN-REDD Program	Leslie Ouarzazi (UNDP/DRC office, Kinshasa), leslieo.cnredd@gmail.com Josep Garí (UNDP/Africa, Nairobi), josep.gari@undp.org Philippe Crete (FAO/Rome), philippe.crete@fao.org Daniel Pouakouyou (UNEP/Nairobi), daniel.pouakouyou@unep.org	*Technical and financial support for REDD+ readiness including support for the national MRV system and the National REDD+ Fund*
Congo Basin Forest Fund (CBFF)	Clotilde Mollo Ngomba c.ngomba@afdb.org	*Financing of integrated REDD+ pilot projects*
Norwegian Agency for Development Cooperation (Norad)	*Tore Langhelle* Tore.Langhelle@norad.no	*Financing of WWF and VCS initiatives for implementing and testing the jurisdictional approach of REDD+*
German Development Bank (KFW), funded by the German Government (Ministry of Environment)	*Uwe Klug* Uwe.Klug@kfw.de	*Financial support through the Carbon Map and Model project (LiDAR etc.)*
European Forest Institute (EFI)	Adeline Dontenville adeline.dontenville@efi.int	*Technical and financial support for various aspects of implementation of REDD+ in the DRC (communication and awareness raising, support for local operators, support for independent observation and South-South cooperation)*
JICA /JAFTA	SHU MIZUSHINA Senior advisor, international Cooperation group smizushina@jafta.or.jp	*Technical and financial support for the strengthening of the DIAF's capacities for inventories and monitoring of forest cover in the Province of Mai Ndombe*
Agence Française de Développement (AFD)	Frédérique Willard, Chef de projet, willardf@afd.fr	*Financial support for (i) the AGEDUFOR project which aim to support sustainable management of forests in DRC (training of administration staff, implementation of forest management plan by forest companies and support the adaptation of the regulative framework) and (ii) the OSFACO project, Spatial observatory of Central and West Africa forests*
Verified Carbon Standard (VCS)	Julianne Baroody jbaroody@v-c-s.org	*Supporting the development and introduction of an REDD+ jurisdictional framework and ensuring the successful application of VCS JNR requirements combined with the Methodological Framework (MF) of the Carbon Fund.*
USAID-CARPE	Julie Fischer, Climate Change Advisor jufischer@usaid.gov	*Financial support through partner NGOs and other agencies involved in participatory activities of land-use planning, REDD+ awareness raising and fire management among communities, strengthening of capacities for REDD+ implementation with a particular focus on environmental and social safeguards.*
United States Forest Service (USFS)	Jean-Solo Ratsisompatrarivo National Coordinator usfs.drc@gmail.com	*Support for the DIAF and for fire management activities in the region of Mai-Ndombe*

Satellite Observatory for the Forests of Central Africa(OSFAC)	Landing Mane lmane@osfac.net	*Technical support for the development of the national and provincial MRV system*
Forest Resources Management Ingenierie (FRMi)	Nicolas Bayol nbayol@frm-france.com	*A firm specialized in the management of forestry resources. Involved in the management plan preparation of several concession in the province. Support for the baseline for planned degradation linked to forest concession holders in the ER program.*
GFA *Consulting Group,* funded by the German Government (Ministry of Environment)	Martin Burian martin.burian@gfa-group.de	*Technical support in the program design phase (Reference Emission Level setting, Monitoring, Reporting and Verification plan support to the design of the investment plan, compliance with VCS standards.)*

2. STRATEGIC CONTEXT AND RATIONALE FOR THE ER PROGRAM

2.1 CURRENT STATUS OF THE READINESS PACKAGE AND SUMMARY OF THE ADDITIONAL ACHIEVEMENTS OF READINESS ACTIVITIES IN THE COUNTRY

The DRC conducted a participatory self-assessment process regarding progress on REDD+ readiness between January and March 2015. Thus, out of the 34 criteria of the Readiness Package Assessment Framework, national stakeholders rated 26 criteria as significantly progressed and eight as satisfactorily progressed. No criteria were found to lack the necessary degree of advancement (See0).

The consensus reached among the various national stakeholders on the status of REDD+ readiness demonstrates that the DRC is sufficiently advanced to enter the REDD+ investment phase, even though some components still require further improvement. A work program has been prepared to consolidate the remaining activities to complete the readiness phase and operationalize the main REDD+ tools. Ten years after embarking on REDD+, the DRC is convinced that only entering the investment phase will allow the country to adjust and improve REDD+ tools by testing them on the ground. (See Annex 4)

An independent expert assessed the Readiness-Package, which considers previous recommendations on DRC's readiness process. The independent review provided positive feedback on both the process and the results of the self-assessment including the work program (ref: TAP Independent Review of the R-Package Submitted by DRC on the FCPF website).

Finally, at the 19th FCPF Participants Committee Meeting (PC19), held from 17 to 19 May 2015 in Washington DC, the DRC presented its Readiness-Package. The FCPF Participants Committee endorsed it and emphasized the importance of the work program to complete the readiness work. (Ref: Resolution PC/19/2015/1).

The DRC will provide a summary of progress on the work program together with the submission of the final ER-PD in early 2016.

2.2 AMBITION AND STRATEGIC RATIONALE FOR THE ER PROGRAM

As the first large-scale REDD+ green development program in the Congo Basin, the Mai Ndombe Emission Reductions Program seeks to promote climate change mitigation actions by establishing a framework for holistic and coordinated land-use planning and capacity building as the basis for sustainable development and to reduce the pressure on primary forests. The program is expected to have a significant impact on poverty reduction and improve livelihoods, to satisfy energy needs and support food security, as well as to promote the conservation and sustainable management of natural resources and the protection of diversity of the local fauna and flora and essential ecosystem services.

The overall objective of the program is to develop a provincial model of green development *that offers alternatives and incentives based on results-based payments to address climate change, reduce poverty, manage natural resources sustainably and maintain biodiversity.*

This program will be one of the first tests of payment for results at large scale within the REDD+ framework. In alignment with the Forest Investment Program (FIP), it will develop activities corresponding to the seven pillars of the National REDD+ Strategy Framework: agriculture, energy, forests, land-use planning, land tenure, governance and demography. Furthermore, the additional investments required for the implementation of the program have been integrated into the National REDD+ Investment Plan 2015-2020 prepared by the DRC in the context of the capitalization of the National REDD+ Fund. The REDD+ Investment Plan builds on an earlier version from 2013 and has been updated for submission to the newly established Central African Forest Initiative (CAFI).[2] The DRC signed the CAFI Joint Declaration in September 2015. Finally, the Mai Ndombe ER Program will enable the DRC to test all the REDD+ tools developed during the readiness phase; such as the national REDD+ registry, safeguard instruments, the feedback and grievance redress mechanism (FGRM), the benefit sharing mechanism, the reference level and the national forest monitoring system (NFMS).

According to the DRC's forest cover change detection map for the period 1990-2010, prepared in 2015 by the DIAF with the support of FAO, **the DRC had a forest cover of approximately 152 million hectares in 2010 and an annual deforestation rate of approximately 0.30% between 1990 and 2010.** The DRC can therefore be classified as a country with high forest cover and low deforestation (HFLD). The HFLD classification was accepted by the Carbon Fund Participants of the FCPF with the inclusion of DRC's proposed ER Program in the FCPF Carbon Fund's pipeline based on the Emission Reductions Program Idea Note (ERPIN).

The Mai Ndombe Province covers an area of 12.3 million hectares, out of which 9.8 million hectares are forests. The main drivers of deforestation and forest degradation in Mai Ndombe, such as artisanal logging for fuelwood, illegal timber logging and widespread slash-and-burn agriculture, are related to its location in between the Kinshasa supply basin for agricultural and wood products and the humid tropical forest. At the same time, the potential to establish an alternative development model is high: many project developers and NGOs are already present in the area, savanna land is available to redirect agricultural production systems and there is significant potential to grow perennial crops and develop the value chains for fishery, aquaculture and livestock.

The ER Program seeks to achieve five objectives: combining carbon and non-carbon benefits in line with the UNFCCC framework for REDD+. They relate to climate, biodiversity, rights, livelihoods, and finance and governance. The objectives consider the FIP results framework as well as the five guiding principles of REDD+. Indicators, baselines and 5-years targets are detailed in Annex 5.

Main objectives of the program until 2021

1. CLIMATE: Emission reductions of 25million tons CO_2 are achieved compared to the reference level and the pressure on forests is reduced

[2]The objectives of the CAFI initiative are to accelerate political and governance reforms in order to counter deforestation in the region and to mobilize international finance in order to implement these reforms and fund investments for sustainable development within the forested regions.

2. BIODIVERSITY: Biodiversity is maintained and ecosystems services are improved
3. RIGHTS: The legal and customary and users rights of local communities and Indigenous Pygmy Peoples over land, territories and resources are recognized, respected and strengthened
4. LIVELIHOODS: REDD+ benefits are shared equitably, improve local livelihoods in the long-term and the well-being of stakeholders, with a particular focus on the most vulnerable groups
5. FINANCE AND GOVERNANCE: Immediate, sufficient and predictable resources are mobilized to reward performance in the priority forest areas in an equitable, transparent, participatory and coordinated manner

2.3 POLITICAL COMMITMENT

The Mai-Ndombe ER Program mirrors the country's high-level political commitment to green growth and reducing deforestation. It is aligned specifically to the pillar "Environmental protection and combating climate change" of the Growth and Poverty Reduction Strategy Paper for the period 2011-2015[3](GPRSP-II). This pillar is one out of four that were identified by the DRC Government as priorities for development and will enter also in the country's National Development Plan, which is currently under development

Political and cross-sectoral commitment on REDD+ is also evidenced by the incorporation of REDD+ measures into the Economic Governance Matrix[4], namely necessary reforms related to land tenure, land-use planning and REDD+ standards in the hydrocarbon and mining sectors. The Technical Committee tracks the Governance Matrix on a monthly basis for Reform Monitoring and Evaluation (CTR) under the oversight of the Ministry of Finance. The table below shows the progress achieved on Measure 13 "Implementation of the REDD+ process" according to the CTR progress report of November 2015.

DRC has integrated the REDD+ related reforms and measures identified in the Governance Matrix in its revised National REDD+ Investment Plan 2015-2020. With the signature of the Letter of Intent between the Government of DRC and the Central African Forest Initiative (CAFI) in April 2016 (see below), DRC has secured the necessary financial support to implement priority measures of the National Investment Plan. It is important to note that the ER Program is therefore now embedded into a context where reforms, governance measures and capacity building will take place simultaneously at national level. This is expected to increase the overall chances of delivery of the ER program (see also Section 4.1).

Table 1 *:*Progress on Measure 13 "Implementation of the REDD+ process" of the DRC's Economic Governance Matrix (CTR report of March 2016)

[3]Growth and poverty reduction strategy papers are prepared by the International Monetary Fund (IMF) member countries following a lengthy consultation process with the stakeholders and development partners, including the services of the World Bankand IMF. They form the subject of annual progress reports and they outline the macroeconomic, structural, and social policies conducted by countries to support growth and poverty reduction, as well as external financing needs and the main sources of financing in this area. GPRSP-II documents may be obtained upon request from: publications@imf.org, or directly on the IMF website: http://www.imf.org

[4] Since 2010, the government has been committed to working closely with the World Bank to establish a mechanism for the systematic improvement of economic governance. A joint mechanism for monitoring the progress on reform implementation has also been established through the preparation of an Economic Governance Matrix. The objective of these reforms is to strengthen governance and transparency in the extractive industries (forestry, mining, and oil sectors) and to improve the business climate.

Activities	**Responsible entity**	**Observations**	**Indicators**
a) Publication of progress made with the "Readiness Package"	Ministry of the Environment	**Achieved.** R-Package report submitted and approved by the FCPF in May 2015:https://www.forestcarbonpartnership.org/democratic-republic-congo.	Satisfactory progress on completion
b) Consistent with the national REDD+ strategy framework, adoption of a national land-use plan	Ministries of Land-use Planning and Environment	**In progress.** Road map for land use reform validated in June 2015. Sectoral program included in National REDD+ Investment Plan. CAFI funding secured to implement the reform and develop land use plan.	Land-use planning policy developed; national plan finalized and published
c) Consistent with the national REDD+ strategy framework, definition of the land tenure reforms needed to support economic development zones and conduct REDD+ pilot initiatives	Ministry of Land Affairs	**In progress.** CONAREF (National Commission for Land Tenure) operationalized. 2015-2016 mission statement adopted. Sectoral program included in National REDD+ Investment Plan. CAFI funding secured to implement the reform, clarify tenure rights and develop conflict resolution mechanism.	Law on land tenure promulgated
d) Adoption of REDD+ standards for mining and hydrocarbons in the forest zones	Ministry of Environment/Mines/Hydrocarbons	**In progress.** Work plan adopted, road map developed. Two site visits conducted in 2015.Draft 0 of standards available. Sectoral program included in National REDD+ Investment Plan. CAFI funding secured to implement pilot projects, capacity building and monitoring methodologies.	Tools on REDD+ finalized
e) Operationalization of the National REDD+ Fund through the mobilization of external resources	Ministries of Finance and Environment	**In progress.** National REDD+ Investment Plan 2015-2020 updated. Letter of Intent between DRC Government and DRC to capitalize the fund signed. First meeting of REDD+ Fund Committee in May 2016. Road map to operationalize the fund adopted.	National Fund operationalized

Furthermore, the DRC has demonstrated its political commitment on REDD+ and the Mai-Ndombe ER Program during the following events in the past four years:

- **October 2011** - President Joseph Kabila organized a High-Level Forum on Climate Change, where he outlined DRC's green growth vision by 2035 and called for "development combining forest preservation, combating climate change, and robust, rapid and sustainable economic and human development";

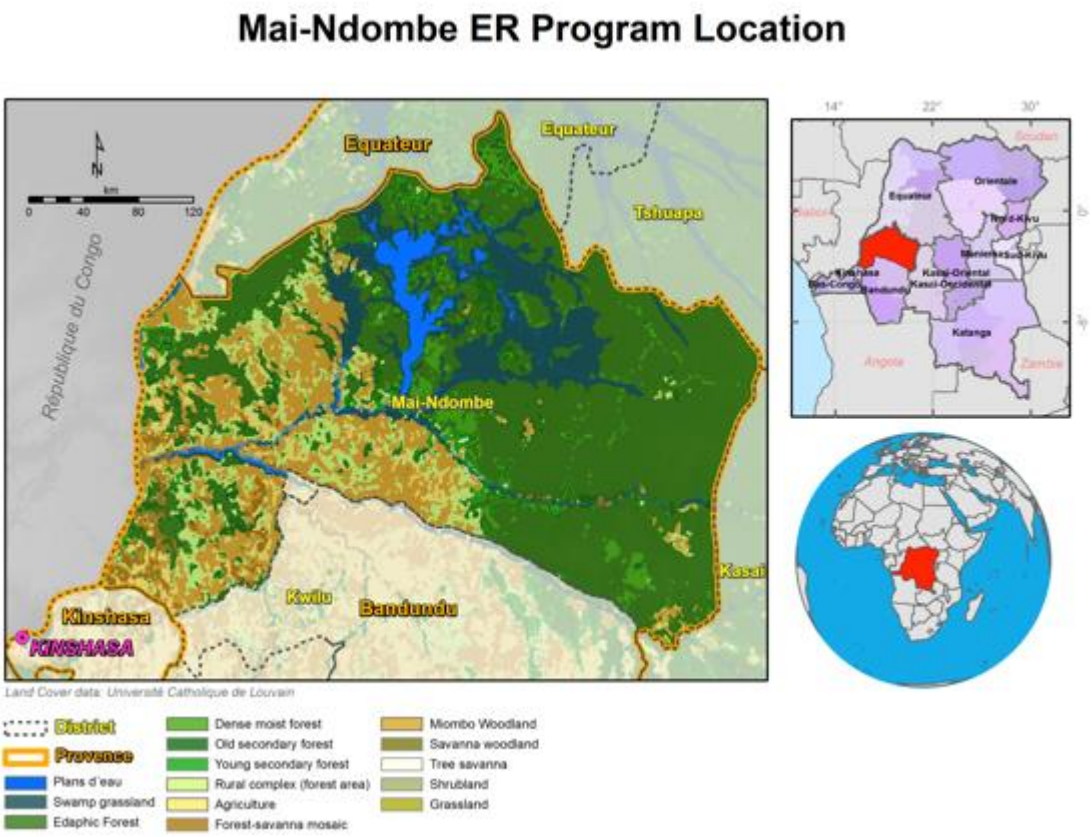
- **December 2011** - The Ministry of Environment presented the ER Program idea at a DRC-hosted side-event at COP17.
- **June 2012** - First presentation of the ER Program Idea Note (ER-PIN) at the FCPF Carbon Fund meeting in Santa Marta, Colombia;
- **December 2012** - The Deputy Prime Minister and Budget Minister, accompanied by the Minster of Environment and the Deputy Minister of Finance, presented the DRC's National REDD+ Strategy Framework, the National REDD+ Fund and the ER-PIN at COP18 in Doha, Qatar;
- **February 2013** - The Minister of Environment, with the participation of the Governor of Bandundu and the Provincial Minister of Environment, led a workshop organized by the National REDD+ Coordination (CN-REDD) in Kinshasa, to finalize the ER-PIN;
- **March 2013** - The Council of Ministers approved the first version of the ER-PIN, which was then presented at the FCPF Carbon Fund meeting in Paris on 24-25 June 2013;
- **March 2014** - The Council of Ministers approved the revised ER-PIN for re-submission to the FCPF Carbon Fund Participants;
- **April 2014** - The Minister of Environment presented the DRC's ER-PIN at the FCPF Carbon Fund meeting, where it was accepted into the Fund's pipeline;
- **September 2014**- The DRC signed the New York Declaration on Forests, a joint commitment by numerous forest and donor countries to provide significant economic incentives to reduce deforestation and restore degraded forest ecosystems. The Minister of Environment presented the Mai-Ndombe ER Program to various potential financial partners at a parallel event to the New York Climate Summit;
- **December 2014**- The DRC signed the "Lima Challenge", a declaration by 14forest countries, conforming their commitment to reduce emissions from deforestation and calling upon the international community to mobilize the necessary financial support.
- **February 2015**- A workshop to launch the design phase of the ERPD for Mai Ndombe was held in the capital of the Bandundu Province under the patronage of the Governor. It contributed to build ownership of the ER Program by communities and local institutions, and encouraged the participation of all interested stakeholders, in particular at provincial level. The almost 250 participants included representatives from national and provincial governments, the provincial parliament and public administration, provincial civil society organizations as well as industrial and small-scale operators.
- **August 2015**- The DRC submitted its Intended Nationally Determined Contribution (INDC) to the UNFCC Secretariat, which outlines a commitment to reduce GHG emissions by 2030 by 17% compared to 2000. Main mitigation measures to achieve that goal include reducing deforestation and forest degradation.
- **September 2015**- An additional investment program to enable the implementation of the Mai-Ndombe ER Program was included as an integrated program in the DRC's National REDD+ Investment Plan.
- **April 2016** - Signature of the Letter of Intent For the Establishment of a Partnership Between the Government of the Democratic Republic of the Congo (DRC) and the Central African Forest Initiative (CAFI) on the implementation of the National REDD+ Framework Strategy and Investment Plan of the DRC. This partnership reiterates the commitment of DRC, based on substantial, additional, new and predictable funding, to reduce its greenhouse gas emissions from deforestation and forest degradation in accordance with the New York Declaration on Forests and in line with the objectives of the National REDD+ Framework Strategy. CAFI is committed to mobilize and secure funding to implement interventions identified in the DRC's National REDD+ Investment Plan. The Executive Board of CAFI, in

its decision of 22 April 2016, approved an allocation of at least 200 Million US$ over the period 2016-2020 for the implementation of the DRC's National REDD+ Investment Plan.

3.ER PROGRAM LOCATION

3.1 ACCOUNTING AREA OF THE ER PROGRAM

The accounting area of the ER Program is the Mai Ndombe Province, located in the west of the country and north of Kinshasa. The Constitution of the DRC (2006) and the Law on Decentralization[5] define the boundaries of the country's new provinces. The Mai-Ndombe Province, which covers an area of 12.8 million hectares, consists of two former districts, which previously were part of the Bandundu Province: Plateau and Mai-Ndombe.



Map 1: Location and vegetation cover in the Mai-Ndombe ER Program area (Source: UCL – Design: J. Freund/WWC)

[5] Organizational law n°08/016 of 7 October 2008 related to the composition, organization and operation of the decentralized territorial entities and their relationship with the State and the provinces.

In early 2015, the National Assembly voted a law on the new administrative division of the country, stipulating the establishment of the new provinces within 12 months by setting up a combined commission of central and provincial representatives. The intermediary executive and legislative authorities of the Mai-Ndombe Province have been established in the second semester of 2015 and in March 2016, the provincial governor and vice-governor have been finally elected.

The launch of the ER Program thus coincides with the creation of the new province and its governmental structures. It is a unique opportunity to align the development priorities of the province with the opportunities offered by the program. Currently, the main economic activities in the new province are related to the exploitation of forest resources.

3.2 ENVIRONMENTAL AND SOCIAL CONDITIONS IN THE ACCOUNTING AREA OF THE ER PROGRAM

ENVIRONMENTAL CONDITIONS

The Mai-Ndombe Province is located on the western fringes of the great equatorial forest of the Congo Basin, at the frontier of the Kinshasa supply basin for agricultural and wood products and the primary forests of the Congo Basin. Since the beginning of colonization, human activity has been substantially changing the vegetation cover in the western part of the province (Territories of Kwamouth, Bolobo, Yumbi, Mushie and Kutu) where almost half of the forests have been lost in the last 100 years. However, it continues to have a large forest area, as the Map 1 above shows. At the same time, there are extensive grass or shrub savanna lands in the south on sandy soil (Kwamouth) and a forest-savanna mosaic in the center on more stable soils (Mushie, Kutu). In the northern territories (Inongo, Kiri) and Oshwe, larger peat swamp forests can be found, which is characteristic for the Lake Tele-Lake Tumba (ecological) landscape. Together, the flooded, semi-flooded and terra firma types of humid tropical forests form a Ramsar[6] biodiversity site (hotspot) of great ecological value offering a variety of habitats and unique ecosystem services.

Annual rainfall varies between 1,900 mm in the north and 1,600 mm in the south. Rainfall occurs mainly in the two rainy seasons (September to December and March to May) with the two dry seasons in between (June to August and January to February), which are less featured in the north. The perceptions of the population regarding climate change – which cannot be confirmed by an adequate series of meteorological findings - are higher temperatures in recent years, more intense dry seasons and more frequent and longer dry periods during the rainy season. Concerns about climate change are widespread among both the urban and rural population.

Virtually all soils in the zone can be categorized as ferrosol and arenoferral soils under savanna (south-west quadrant) and as ferrosol and arenoferral soils under large equatorial forests (north-west, south-west and north quadrants). In ferrosols and arenoferrals (lateritic soils with a high iron content), organic matter is generally low. They degrade rapidly when slash-and-burn practices occur and become more acid and poor of organic matter to the point that they only support grass or shrub covered savannas (of man-made origin). The uncontrolled and repeated use of fire, for hunting purposes and/or for the renewal of the forage grass

[6] This Ramsar site is one of the biggest complexes of wetlands in Africa and contains habitats that are critical for several species of freshwater birds, monkeys (Bonobos), forest elephants (Loxodonta africana cyclotis), and leopards.

stratum, is also a major factor in the progressive increase in the proportion of savanna coverage in the west of the province.

SOCIAL CONDITIONS

Mai-Ndombe is one of the biggest provinces in the DRC. Its population (1,500,000 inhabitants) and density (13 inhabitants /km2), however, make it one of the least populated provinces. The population density varies widely within the province between 80 inhabitants / km2 in the small Yumbi territory and 7 in the Kwamouth territory. A gradient that widens in relation to forest-covered surfaces, as shown in the Table 2 below. Growth is estimated at approximately 3% per year[7].

Table 2*:* Territories, total areas and Forest areas, population, density in the program area (2012)

Territory	Total Area (TA) (km2)	2012 Population	Total Density (inhabitants /km2)	Forest Areas (FA) (km2)	FA to TA rate	Density in relation to FA (inhabitants /km2)
Inongo	25,132	315,630	13	21,769	87%	14
Kiri	14,133	158,200	11	13,580	96%	12
Kutu	19,237	405,796	21	16,271	85%	25
Oshwe	41,141	162,069	4	40,431	98%	4
Mai-Ndombe	99,641	1,041,695	10	92,051	92%	11
Bolobo	4,124	112,531	27	2,976	72%	38
Kwamouth	14,552	94,933	7	8,760	60%	11
Mushie	11,860	103,254	9	9,406	79%	11
Yumbi	1,215	97,112	80	844	69%	115
Plateaux	31,751	407,829	13	21,986	69%	19
Province of Mai-Ndombe	**131,393**	**1,449,524**	**11**	**114,037**	**87%**	**13**

Sources: Ministry of Health, Forest Atlas of the DRC (2012), and Ministry of the Interior. According to BioCFplus Mission 2014.

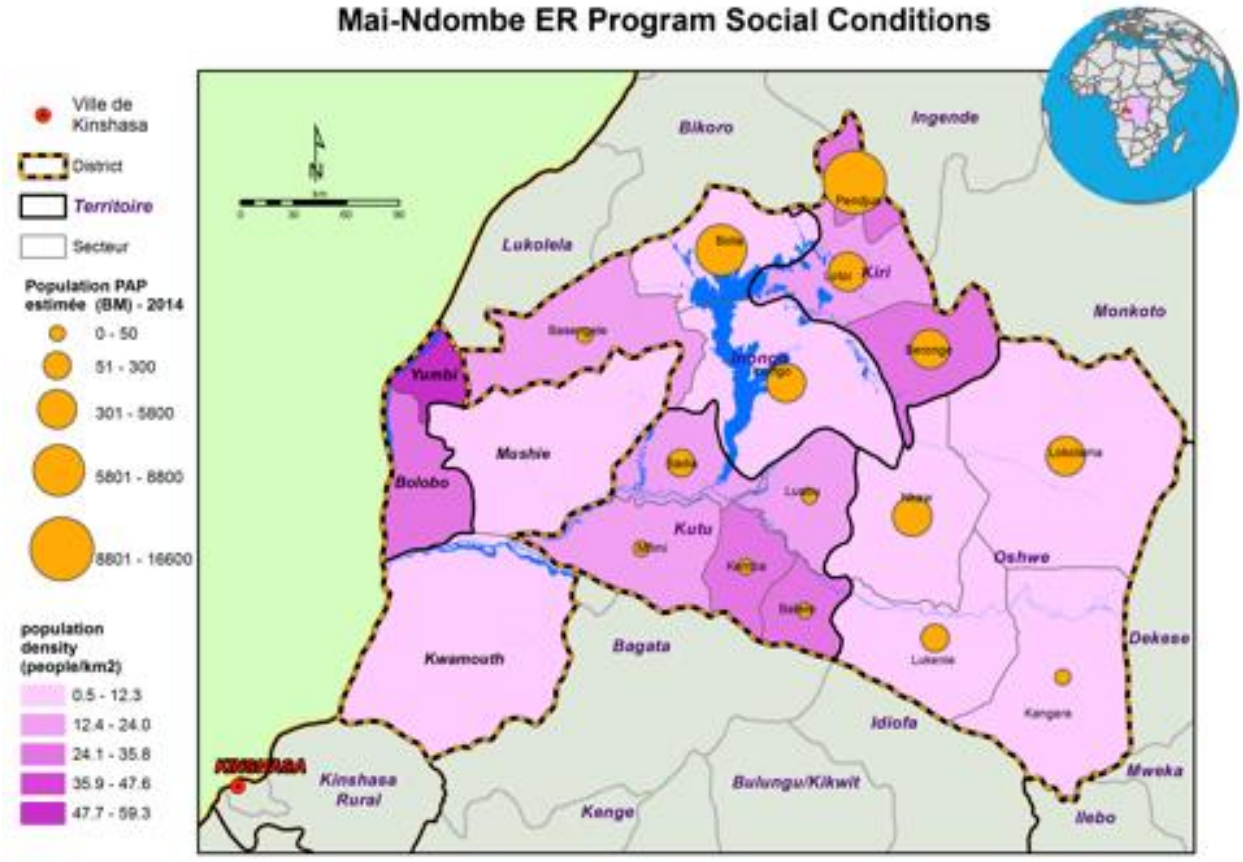
The administrative organization comprises two former districts, 8 territories, 23 sectors, 66 communities, 4 towns (Inongo, Kutu, Nioki, Mushie, Bolobo) and thousands of villages. Almost all the villages have a local chief appointed by the public administration. The Constitution and the Law on Decentralization establish sectors as basic territorial entities.

Logging concessions, livestock, conservation concessions and protected areas account for 30% of the province's total area. The remaining 70% is customary land, out of which 46% are forests and the remainder is savanna land. [8] The community population is organized in villages of 50 to 300 households located along

[7] For all the calculations in this report, the population growth rate in rural areas is that of Leon de Saint Moulin and of the National Statistics Institute (3.4% annual national average, 3% in rural areas and 6% in towns and cities).

[8] It should be noted that the communities continue to exercise usage rights inside the forest concessions (see Forest Code); 70% of the surface area is therefore at the disposal of the communities.

the major waterways and their tributaries (Congo, Kasai, Mfimi, Molibampe, Bolongo Lule, Lutoy, Lokoro, Lake Mai-Ndombe, Lukenie) and main roads.



Map 2: Social conditions in the program area and density of Indigenous Pygmy Peoples population (Source: BioCFplus mission report - Design: J. Freund/WWC)

The population of Mai-Ndombe is Bantu and Pygmies. The Bantu, namely Anamongo, Bateke, Basakata, Baboma and some others (Tende, Nunu fishermen) are distributed across all the territories with a north-south divide considering patrilinear organization in the north (Anamongo: Kiri, Inongo) and matrilinear organization in the south (Teke in Kwamouth, Bolobo and Yumbi; Baboma in Mushie; Basakata in Kutu). Each of these groups has its own language but Lingala and French are common languages.

Indigenous Pygmy Peoples (IPP) represents some 3% of the population. The BioCFplus feasibility study found a total population of IPP of around 45,000 people living in 177 villages (10% of the total number of villages in the province, but 13% in the Mai Ndombe District). None of the villages in the Plateau District has IPP and the district is not a traditional IPP migration area. Indigenous Pygmy Peoples are strongly represented in the "Anamongo" territories, Kiri, Oshwe and Inongo. The history of the Mai-Ndombe province peopling remains unknown for the most part. Apart from a few recognized Twa Land Chiefdom - organized in a Mongo fashion - the majority (80%) of Batwa live in mixed villages with Bantu[9]. The relationship between Bantu and Pygmies is complex and varies greatly from one area to another. In mixed

[9] BioCFplus Mission survey in the district of Mai-Ndombe (November 2014).

villages, Bantu groups usually claim customary ownership of the land and Pygmies are endowed with restricted user rights, which can be subjected to various degrees of servitude. Although some pygmy groups of the Mai-Ndombe have successfully asserted their rights in recent years, Batwa user rights remain precarious. This situation is related to the widespread discrimination that Batwa face. Some Twa groups have adopted a sedentary lifestyle a long time ago, when they settled in the area along with the Mongo. This sedentarization movement accelerated over the 20th century with colonial policies and the introduction of labor-intensive agriculture. Even though agriculture and livestock farming have since then been important subsistence activities for the Batwa, they still use areas of around twenty kilometers around their villages for hunting, gathering, apiculture and ritual purposes. They practice agriculture, either for subsistence or as labor on Bantu land for income generation. More information about the situation of the Indigenous Pygmy Peoplesis provided in Annex 6.

The rural population of the Mai Ndombe province pursues five key economic activities: agriculture, small livestock farming, fishing, hunting, and gathering. Hunting and gathering are very important for the Pygmies, but are practiced more broadly by the entire rural population. The main activity for 90% of the communities is agriculture, cassava and maize as cash crops to generate income. Cash crops are also of increasing importance for the IPP and specialized fishing populations because of depleting fish resources caused by the applied fishing techniques and the increasing number of fishermen. The survey conducted by the BioCFplus feasibility study among a sample of 400 households suggests an average income of 450 dollars per household and year, out of which two-third is generated by agriculture (cassava, maize, rice). The remainder is primarily derived from fishing and livestock farming as well as hunting, gathering and product processing.

4. DESCRIPTION OF THE ACTIONS AND INTERVENTIONS TO BE IMPLEMENTED UNDER THE ER PROGRAM

4.1 ANALYSIS OF DRIVERS AND UNDERLYING CAUSES OF DEFORESTATION AND FOREST DEGRADATION AND EXISTING ACTIVITIES THAT CAN LEAD TO THE CONSERVATION OR ENHANCEMENT OF FOREST CARBON STOCKS

The most recent analysis of the forest coverage change in Mai-Ndombe indicates a deforestation rate of 0,53%/year and a degradation rate of 0.52%/year for the period 2004-2014 (WWC/OSFAC, 2015). In general, the causes of this reduction in forest cover in Mai-Ndombe are identical to those identified at national level and set out below, which summarizes the national consensus obtained after numerous quantitative and qualitative studies.

This section gives a more detailed analysis of the situation in Mai-Ndombe in order better to quantify the impact of the direct causes and identify the key underlying causes in the region. The distinctive feature of the Mai Ndombe Province is its location at the intersection of various human and resource flows between the megalopolis of Kinshasa (over 10 million inhabitants) and the provinces of Bandundu and the Equator, where most of the dense humid forests of the DRC are located.

THE DIRECT CAUSES OF DEFORESTATION AND FOREST DEGRADATION IN MAI-NDOMBE

1. **Slash-and-burn agriculture:** According to two studies in the districts of Plateaux and Mai-Ndombe, the average family uses an area of 1 hectare for farming, applying a fallow-slash and burn system on forest land[10], whereas savanna lands are only marginally cultivated or not at all. This system requires an area of 5 hectares per household on the basis of a 5-year rotation. With an annual population growth rate of 3%, every year means an additional 6,500 agricultural households, each needing 5 hectares of primary forest (or mature secondary forest) to achieve a stable agricultural production system, equivalent to 32,500 hectares per year. Agriculture is practiced on non-flooded land, as opposed to land that is permanently or temporarily flooded during the rainy season (precisely when cultivation takes place). Non-flooded forest and rural complex land represent an area of approximately 99,174 km^2 in the province, out of which 12% was cultivated in 2012 (Hansen et al.).
2. **Fuelwood production:** Charcoal production has been practiced on the banks of the River Congo for several decades, in particular on the left bank, which is undergoing grass savannization. Most of the charcoal produced in Mai-Ndombe contributes to the 23% of fuelwood that is taken to Kinshasa by

[10] BioCFplus Mission survey in the district of Mai-Ndombe (sample of 400 households) in November 2014 and surveys by the Provincial Ministry of Agriculture (Bandundu) PAB/EU/ISCO in the 4 territories of the Plateau in 2011.

waterway from the area to the north-east of the capital. This represents 4.7 million m^3 of fuelwood consumed per year with a market value estimated at 143 million US dollars.[11]The depletion of the forests of the Lower Congo and the reduction, as of 2010, in the cost of transporting goods by waterway have resulted in the very deep penetration of charcoal production along the rivers and around the Lake Mai-Ndombe. That means charcoal is produced more than 500 km away from Kinshasa, which together with Brazzaville is the destination for the product. Entrepreneurs who formerly operated in the Lower Congo and use young people from the villages as labor often conduct charcoal production. In Mai-Ndombe, the price of a sack of charcoal is half that charged in the rest of previous Bandundu Province and the Lower Congo (4,000 CDF[12] compared with 8,000 CDF). The local population favors charcoal production because it generates significant revenues in the short term. In one month, a professional with one or two assistants can produce 300 sacks at 4,000 CDF per sack, which totals 1,200,000 CDF, whereas other economic activities (cassava, maize, rice and groundnut production) generate average revenues around 400,000 CDF per year.[13]

3. **Uncontrolled bush fires preventing natural regeneration:** The high frequency of uncontrolled fires has a very significant impact on forest cover. In the wooded savannas and forest margins, fires prevent natural regeneration by burning young trees and seeds. These fires can cover very great distances, contributing to the maintenance and extension of anthropogenic savannas on lands largely intended to be forested. The spread of these fires can have several causes. Livestock farms, for example, use fire to regenerate pastureland[14], the local population lights fires for slash-and-burn farming to maintain paths and for hunting in order to trap animals, but also accidentally. As a rule, the absence of control and collective responsibility together with failure to apply the law reinforce this phenomenon.

4. **Small-scale or artisanal logging:** The region is seeing a chaotic expansion of illegal logging including small-scale logging and "semi-industrial" operators using heavy machinery. Some of these loggers do not hold permits and even when they do, logging operations frequently do not respect designated harvesting areas or authorized volumes. The result is anarchic, uncontrolled logging that is responsible for significant GHG emissions. It is estimated that 240,000 m^3 of wood[15] is illegally produced in the Mai Ndombe Province every year by informal sector operators, the traceability and sustainability of which cannot be guaranteed.

5. **Industrial logging:** In Mai-Ndombe, twenty forest concessions have been allocated, 11 of them to the company SODEFOR as shown inbelow. These forest concessions are at different stages in the forest management process and only 3 concessions have submitted their management plans (and 1 has been approved by the administration). In 2015, only 7 concessions were exploited. (See **Table *3*** and Annex 7). The forestry sector is currently slowing down and seeing a drop in demand internationally. The DRC is particularly affected as it suffers from a negative image due to frequent campaigning actions.

[11] Schure, J., Ingram, V. and Akalakou Mayimba, C. Fuelwood in DR Congo: Analysis of the Kinshasa and Kisangani channels, 2011, p. 92.

[12] 1US$ equivalent to 927,6 CDF – 2016.01.31.

[13]BioCFplus Mission survey in the district of Mai-Ndombe (November 2014).

[14] Livestock has become a popular activity among the most prosperous farmers and town dwellers, senior officials and traders. These people purchase "farms" of 50 to 500 hectares. Livestock is reared very intensively on these farms, and the practice of bush fires prevents natural regeneration and threatens certain agricultural and forest zones.

[15] Lescuyer G, Cerutti P.O, Tshimpanga P, Biloko F, Adebu-Abdala B, Tsanga R, Yembe-Yembe, R.I and Essiane- Mendoula E. 2014. The domestic small-scale sawing market in the Democratic Republic of Congo: State of play, opportunities, challenges. Occasional Paper 110. CIFOR, Bogor, Indonesia.

Therefore, timber companies are facing important difficulties in complying with the forest code, in particular to sustainably manage their activities and comply with their social engagements.

Nonetheless, in terms of impact on forest carbon, industrial harvesting is translating into a reduction in carbon stocks per hectare within the concessions due to selective felling and the construction of associated infrastructure (roads, use of industrial tools). Furthermore, the opening of remote regions and the economic opportunities for the local population are leading to an effect of deforestation and degradation "cascade", connected with felling/slash-and-burn activities and fuelwood production developing in and around the concessions.

Table 3*:* Forestry companies established in the Province of Mai-Ndombe (Source: FRMi, 2015)

Company	No. of concessions	Area (ha)	% of the area licensed to concession
Sodefor	11	2,324,745	65.4%
Somicongo	1	294,014	8.3%
Siforco	1	194,636	5.5%
La Forestière du Lac	1	185,171	5.2%
Compagnie des Bois	1	148,081	4.2%
ITB	1	127,719	3.6%
SCTP ex-Onatra	1	121,214	3.4%
Maison NBK Service	1	79,730	2.2%
Tala Tina	1	40,040	1.1%
Riba Congo	1	37,367	1.1%
Overall total	**20**	**3,552,717**	**100.0%**

6. **Mining and oil exploitation.** Mai-Ndombe has deep oil resources, which makes their exploitation difficult and has prevented it up to now. Small-scale diamond exploitation in the River Kasai is longstanding but since 2010 it has seen an acceleration due to the use of diving gear. Large mines appear and disappear from one day to the next along the river. Mining activities represent a population of thousands of people, who constitute a localized and mobile market opportunity for farmers living along the banks to sell their products at higher prices. Overall, mining exploitation is not currently an employment alternative in the Mai Ndombe Province and its impact on deforestation is very low to non-existent.

STAKEHOLDERS IN DEFORESTATION AND FOREST DEGRADATION

Several stakeholders are involved in the dynamics of deforestation and forest degradation depending on the exact area. Stakeholders are generally representative for the situation at the national level, but specificity is the proximity to Kinshasa. The agents of deforestation and forest degradation are:

a. Direct and local:

- Local population (farmers and producers/consumers of fuelwood, charcoal and agricultural production);
- Forest concession holders;
- Small-scale loggers;
- Agricultural and livestock farmers.

b. Indirect and external

- Consumers of charcoal and lumber in Kinshasa;

- Consumers of lumber at international level;
- Consumers of agricultural products (maize, cassava) in Kinshasa.

Within the ER Program area, the dynamics of deforestation and degradation have been identified. They vary according to the prevalent land use and location, e.g. within a forest concession, a nature reserve or in an unallocated area. The table 4below shows the main elements of the dynamics of deforestation/degradation according to zone type. These elements constitute the basic information for development of the intervention strategy. It should be noted that the threats are not mutually exclusive, but can occur in succession and even exacerbate one another.

Table 4*:* Summary of the main agents and factors of deforestation and forest degradation according to the types of land use in the ER Program area

Zone type		Area (M ha)	Agents	Agriculture	Fuelwood	Fire	Art. Logging	Ind. logging	Infrastr. /mines
Converted logging titles[16]	Production series	1.52	Logging companies					✓	
	Protection and conservation series	1.15	Local population		✓		✓		
	Rural development zone	0.89	Local population	✓	✓		✓		
Classified forests		2.04	Local population	✓	✓		✓		
Conservation concession		0.32	Local population	✓	✓		✓		
Zones under customary regime *(non-concession, non-classified)*	Afforested	4.34	Local population Small-scale loggers	✓	✓		✓		
	Non-afforested	2.58	Local population			✓			
Emphyteutic concessions and farm leases		0.80	Farmers; livestock rearers and neighboring population			✓			
Mining sites and infrastructure		Less than 0.01	State and mining concession holders						✓

THE UNDERLYING CAUSES AND KEY TRENDS

The factors underlying the reduction of forest cover are: poverty, the absence of economic and technical alternatives, poor management of natural resources, unregulated land tenure, population growth and increased demand for agricultural products, charcoal and land. **Growing demand for agricultural and wood products as well as for land, which is reinforced by the rising population and economic migration,**

[16] Estimates of the areas of forest concessions on the basis of existing management plans (FRMi, 2015).

constitute strong trends towards increased pressure on forests. These underlying causes need to be addressed specifically by the program's intervention strategy.

Growing demand for agricultural and wood products. The Mai-Ndombe Province is located in the Kinshasa supply basin for agricultural and wood products, fuelwood in particular. Agricultures the main income source for 90% of the households in the province, cassava and maize are the main cash crops sold primarily to Kinshasa. Importantly, Mai-Ndombe has become an important, or even the most important, source of charcoal supplies for Kinshasa as a result of the depletion of the forests of the Lower Congo between 2000 and 2010. This pressure on Mai Ndombe's forest resources will continue to be exacerbated as demand from Kinshasa rises and the surrounding forests shrink.

Requirements for land, population increase and migration. The demand for slash-and-burn farming land is significant and constitutes the most important driver of deforestation in Mai-Ndombe. Furthermore, if unsuitable or occupied land is excluded (flooded forests, concessions representing approximately 41% of the province's area), the remaining forested area represents approximately 46% of the province's total area. With a population growth rate of 3% it can be estimated that in approximately 33 years the non-concession and non-flooded forests of Mai-Ndombe will be totally lost to agriculture.[17] Moreover, these estimates do not take account of the significant (and as yet unstudied) migration to the province from the savanna lands of Kwilu (Masi Manimba, Idiofa, Bulungu) and the man-made forests of northern Idiofa on the left bank of the River Kasai. The regions under greatest threat from this migration are the forests of Kwamouth and southern Oshwe.

EXISTING POLICIES AND ACTIVITIES THAT CAN LEAD TO THE CONSERVATION OR ENHANCEMENT OF EXISTING CARBON STOCKS

This sub-section describe existing or planned policies, investment programs, activities that are supporting the conservation and enhancement of existing of carbon stocks. The ER Program will build on this multiple initiative to roll-out its implementation and achieve its objectives.

EXISTING ACTIVITIES IN MAI-NDOMBE PROVINCE

Severalproject and economic activities pursued within the program area are also contributing to the conservation and enhancement of forest carbon stocks. The program will fully capitalize these initiatives, render them viable and scale them up through its innovative and predictable financing framework.

The WWC conservation concession. In 2010, the ERA Company made a formal request to the government of the DRC to manage two concessions, whose exploitation permits had been suspended, for the purposes of conservation by leveraging the carbon revenues generated. The VCS and the CCBA validated the Mai Ndombe REDD+ project, sponsored by the joint venture ERA/WWC, in December 2012. The objective of the project is to address drivers of deforestation and degradation such as logging, slash-and-burn farming and the intensive production of charcoal. The activities are mostly at community scale aiming at reducing destructive practices and improving agricultural production.

The activities of the Novacel Company, in particular the South-Kwamouth Novacel project. The Novacel Company initiated the first agroforestry carbon sink project in Africa in the village of Ibi on the outskirts of Kinshasa. It has developed an innovative agroforestry model based on acacia and cassava. With financing from the Congo Basin Forest Fund (CBFF), Novacel and its partner GI-Agro have developed the Novacel South Kwamouth project in several chiefdoms in the south of the Plateau district. The activities include

[17] BioCFplus Mission survey in the district of Mai-Ndombe (November 2014).

agroforestry plantations, assisted natural regeneration on savanna land and development of local infrastructure.

The Forest and Nature Conservation Project (financed by the International Development Association, IDA) supported the development of Indigenous Pygmy Peoples Development Plans (IPDP) in 2013 in the territories of Kiri, Ochwe and Inongo. Every IPDP proposes a work program over a 4 year period with detailed micro-projects to be financed for a total of 26.73 million USD (Inongo: 9,03 M$, Kiri: 8,85 M$, Ochwe: 8,85 M$). The program will capitalize on this planning work to streamline investments in mitigation activities towards Indigenous Pygmy Peoples. This project also facilitated the negotiation of social clauses between forest concessions and communities (according to the Forest Code). In the Mai-Ndombe, it concerned 9 concessions for a total projected amount of 1.2 million USD that are or will be allocated for local development projects (see table below).

Table 5*:* Projected amount for Local Development Fund of forest concession in the Mai Ndombe Province[18]

Company	N° CCF	Area CCF (ha)	Projected amount for the operating period
SODEFOR	035/11	200 144	$322 988,00
SODEFOR	039/11	238 896	$314 801,00
SIFORCO	040/11	194 636	$142 142,00
SODEFOR	045/11	336 916	$187 688,00
FOLAC	048/12	185 171	$185 168,00
NBK SERVICES	049/14	79 730	$9 928,00
TALA TINA	050/14	40 040	$8 657,00
SCTP ex-ONATRA	055/14	121 214	$16 807,00
SODEFOR	061/14	239 858	$66 214,00
Total		**3 552 717**	**$1 254 393,00**

The production of perennial crops: coffee, rubber and cocoa. The restoration of existing plantations of perennial crops and expanding them into the savanna zones are important to generate revenues and employment for the local population and, thus, provide an alternative for slash-and-burn agriculture, which is very land consuming. In contrast to the Plateau district, the Mai-Ndombe district was previously an important area for the production of coffee and rubber as well as cocoa on a smaller scale (Inongo, Kiri, northern Oshwe). Tens of thousands of hectares of plantations were abandoned in the 1970s (Zairianization) and 1980s (drop in market prices). The NGO Trias has initiated the revival of cocoa production in Inongo. Producer cooperatives were created (which exported 120 tones of cocoa in 2014) and equipped with working capital and means for transportation, fermentation, and drying. Furthermore, a program was launched to restore cocoa farms and train farmer about improved cultivation practices. After a period of inactivity, the rubber plantations of Inongo and Lukenie are being reactivated by the Société Congo Forêt, which owns a processing unit in Dima, near Bandundu-Ville.

[18] Source: Mission de facilitation des négociations des clauses sociales des cahiers des charges des contrats de concession forestière – Rapport trimestriel Octobre-Décembre 2014 – Projet Forêts et Conservation de la Nature -Ministère Environnement et Développement Durable.

Reduced Impact Logging activities in SODEFOR concessions. SODEFOR has implemented Reduced Impact Logging (RIL) practices with a view to achieve FSC certification in three concessions (Nteno, Madjoko, and Isongo) since 2010 with support of WWF (financed by KFW), in anticipation of a REDD+ program, aiming further to follow law to ensure the effectiveness of the sustainable forest management. This resulted in the reduction of more than 50% of damage on woods compared to conventional logging as well as for the damaged area by forest machines. In addition, no or few penalties and fewer problems with the forestry administration were found after the control. SODEFOR has continued to engage in RIL activities to advance sustainable forest management progressively for all concessions and to provide trainings and strengthen workers on RIL techniques.

SOCALCOis an innovative high tech company that has been successfully operating in DRC for over 35 years. SOCALCO has captured 70% of the domestic DRC match market and is poised to greatly expand its production. The factory in Kinshasa produce a produces a high quality, no sulphur and no heavy metal safety match that meets EU standards and can replace unsustainably produced matches presently being imported by African countries and the EU. To achieve the planned big expansion, it needs to secure a long-term socially and environmentally sustainable supply of raw material. SOCALCO is currently designing and raising funds for a sub-project of the Mai-Ndombe ER-Program. Its plan is to develop a sustainable supply chain via a two-component approach that would be implemented simultaneously. The first component would focus on obtaining, over the short term, a sustainable source of raw material (peeler logs for making the veneer from which splints are made) from naturally occurring stands of timber. A second component would involve the establishment of agroforestry plantations that would produce (starting in 8 to 10 years) an alternate sustainable source of raw material for match splint production. Suitable (for match splint manufacturing) native species such as Funtumia africana would be multi-cropped with, high value, perennial and short cycle food crops) over the mid to long term. Combined, both phases would ensure that SOCALCO's raw material supply chain and associated smallholder farming activity would not be responsible for any net deforestation. It would thereby propel over 8,000 smallholder-farming families and their communities out of extreme poverty.

Other activities outside the program area are also contributing to the conservation and enhancement of forest carbon stocks, in particular around Kinshasa related to establishing a sustainable charcoal supply and reducing pressure on forests.

a. **The plantations of the Mampu and the N'Tsio project**. Initially, Mampu was a pre-urban reforestation project financed by the Congolese State (Zaire at the time) in the 1960s to meet the demand for fuelwood in Kinshasa. Later, the land was given to private farmers to have better control over fires and to generate socio-economic benefits. Thus, Mampu became an agroforestry project with over 300 farmers. The project was coordinated locally by the Hanns Seidel Foundation until February 2009 and is managed by a local body, the Union of Farmers of Mampu, today. The Foundation is now developing the N'Tsio project with several villages on the Batéké plateau. The new project is supporting village communities in developing agroforestry projects to promote sedentary agriculture and produce charcoal for the Kinshasa market.

b. **The improved cookstove initiatives in Kinshasa**. At present, several stakeholders are supporting improved cookstoves in Kinshasa. Institutions including the GIZ and SNV are supporting the dissemination of cookstoves such as the Prakti, imported from India, or the Kin Stove, produced locally by a network of craftsman. A subsidiary of Ecosur Afrique, called Biso Na Bino, produces and markets the Jiko Mamu cookstove and aims at producing 10,000 units per month by the end of 2015. This project is also registered with the Clean Development Mechanism (CDM).

c. **The SNV Sustainable Charcoal project** aimed to develop a commercially viable sustainable charcoal supply between the charcoal production areas and the center of Kinshasa. The dual objective until the end of 2015 is (i) to improve access to sustainable charcoal in the poor districts of Kinshasa and

ii) to improve incomes and living conditions for the charcoal producers in the areas surrounding Kinshasa. Part of the strategy is to formalize the sector and to introduce a system of tax incentives to encourage sustainable practices. The objective is that by the end of 2015 at least 5,000 people in Kinshasa will have a steady supply of sustainable charcoal and at least 300 charcoal producers will have increased incomes. By March 2015, 434 charcoal producers had been organized into 11 cooperatives, which constructed 176 improved charcoal kilns in six months. Sustainable charcoal production quotas are currently being introduced in five villages.

POLICIES AND REDD+ NATIONAL INVESTMENT PROGRAMS

Several laws and policies are contributing to the conservation and enhancement of carbon stocks or have the potential to do so (See Section 4.4). Such policies include:

a. The Forest Code of 2002, which introduced the concept of management plans as a prerequisite to any management or exploitation in the forestry sector (Articles 71 and 72). It should be noted that sustainable forest management is only mandatory within the framework of a concession title (exploitation or conservation) and therefore only applies to permanent production forests. In practice, small-scale logging still circumvents this obligation, although the regulations on small-scale logging will change with the revision of the Decree on logging. According to the Forest Code, a management plan is a prerequisite for any exploitation.
b. The Forest Code also advocates the prohibition of burning savannas, which is very poorly enforced, as described above.
c. The repeatedly asserted commitment to strengthen the existing protected areas and to extend their coverage to approximately 17% of the national territory (it is at approximately 12% today).
d. Since 2002, the application of a moratorium on the granting of new forest concession titles, as well as on their renewal or extension. Despite a number of withdrawal attempts, the moratorium has remained in place up to now. However, some previously granted titles have been "recovered" in the conversion process.

The adoption and implementation of these policies and measures are hindered by a certain number of political, financial, governance- and capacity-related barriers.

The Central African Forest Initiative (CAFI) will support the implementation of the National REDD+ Framework Strategy. The Letter of Intent for the establishment of a partnership between the DRC and CAFI was signed on 2016 April 18. This partnership will allow DRC to implement key reforms at the national level and support integrated programs in provinces. The Mai-Ndombe ER-Program will therefore be completely embedded into simultaneous measures at national level, which will have a positive effect on the program strategy to minimize deforestation and forest degradation. CAFI will support DRC during the period 2016-2020 for a total amount of 200 million US$. The following components will be supported by CAFI including sectoral programs at national level and integrated programs at provincial level:

- **Agriculture** (US$ 66.4 million, out of which US$ 48 million are for integrated programs): Develop and implement, in a participatory and transparent manner, an agricultural policy that contributes to rural development and national food security while limiting the current and future impact on forests.
- **Energy** (US$ 28 million, out of which US$ 10.4 million are for integrated programs): Develop and implement, in a participatory and transparent manner, an energy policy for sustainable management of wood energy and partial substitute to the latter.
- **Forests** (US$ 29.6 million, out of which US$ 4 million are for integrated programs): Develop and implement, in a participatory and transparent manner, a forest policy for sustainable management of forest resources by multiple stakeholders in the sector, including local and indigenous communities,

with particular emphasis on forest law compliance, governance and various local and community management models. DRC commits to strengthen oversight in existing forest exploitation areas and in the areas where potential new concessions will be attributed, in order to apply the forest law.

- **Mining and hydrocarbon standards** (US$ 4.8 million, out of which US$ 2.4 million for integrated programs): Adopt and implement, in a transparent and participatory manner, REDD + standards for mining and hydrocarbon investments in forest areas in order to prevent, reduce and otherwise offset their impacts on forests.
- **Land-Use Planning** (US$ 21.6 million, out of which US$ 12 million are for integrated programs): Develop and implement, in a transparent and participatory manner, a land-use policy that organizes and optimizes the use of land and forest resources by the various national economic sectors, in respect of rights recognized in the DRC legal system, in order to reduce the impact thereof on forests, reduce conflicts and ensure sustainable development at national and local level.
- **Land Tenure** (US$ 11.2 million, out of which US$ 3.2 million are for integrated programs): Develop and implement in a participatory and transparent manner a land-tenure policy that is equitable -including with regard to gender, vulnerable people, local communities and Indigenous Pygmy Peoples-, and that could ensure the sustainable and non-confrontational management of land and the clarification of tenure rights, with the goal of limiting the conversion of forest lands.
- **Population** (US$ 12 million, out of which US$ 4 million are for integrated programs): Support the participatory implementation of the National Multisectoral Strategic Plan for Family Planning, 2014-2020

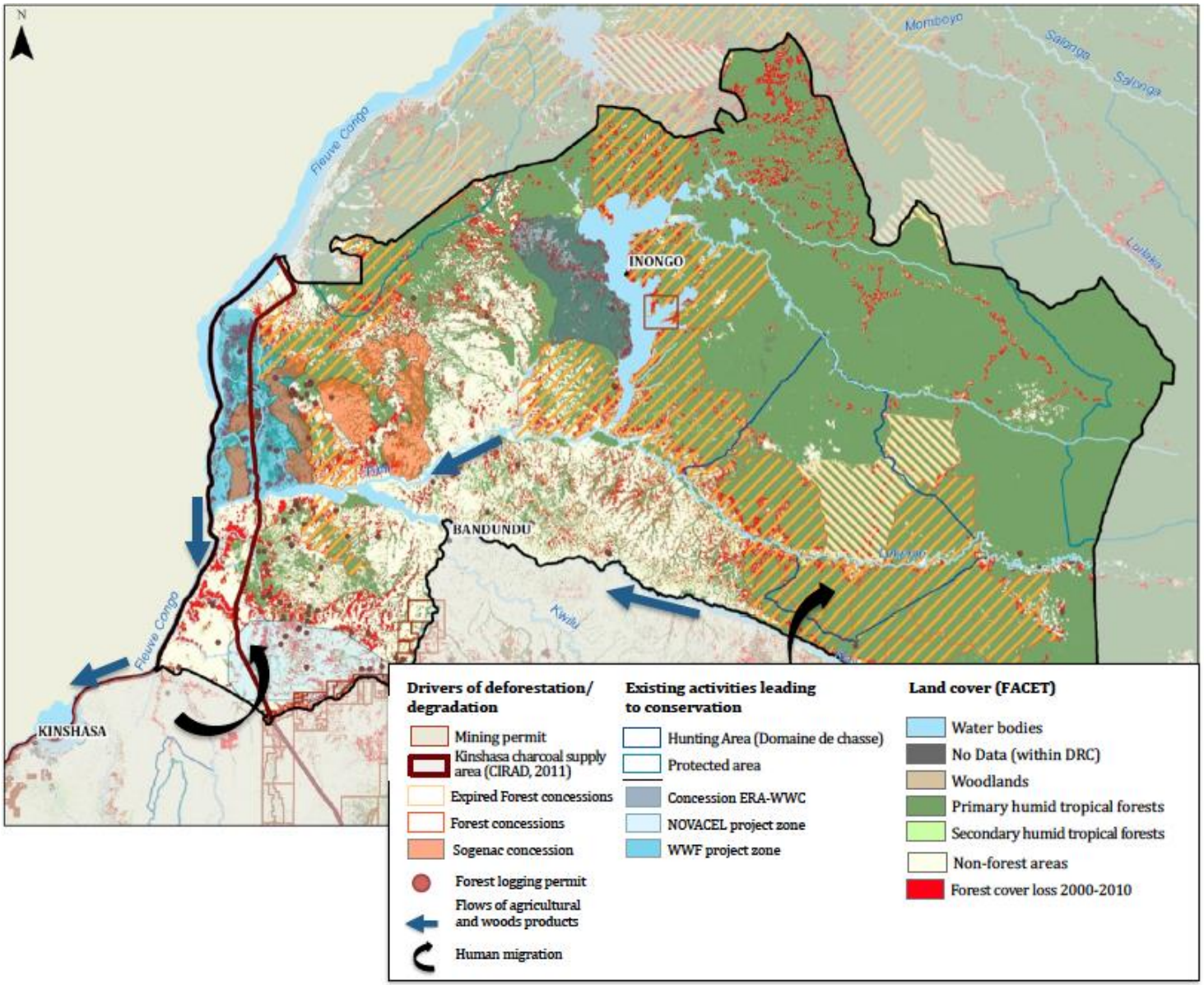
The Forest Investment Program (FIP). The objective of Improved Forested Landscape Management Project (PGAPF in French) in the Kinshasa supply basin is to improve the living conditions and management of forest landscapes to reduce GHG emissions generated by deforestation and forest degradation. It has $US 36.9 million in funding and was launched in the first quarter of 2015. It comprises 4 components:

- Component 1 ($US 14.2 million), the Plateau Integrated REDD+ Project (PIREDD Plateau), constitutes a major element of the Mai Ndombe ER Program (see below).
- Component 2a ($US 5.9 million) concerns agroforestry plantations in the savanna (from 50 to 500 ha). It targets the cooperation with the private sector through the co-financing of investments and works through calls for proposals. Some of the ER program's plantations will thus be able to benefit from this co-financing.
- Component 2b ($US 2.1 million) is aimed at reducing the consumption of fuelwood by urban households, in Kinshasa in particular, in support of private entrepreneurs distributing improved cookstoves that are certified for performance.
- Component 3 ($US 10.5 million) will support seven Local Executing Agencies (LEA), most of them located in the Lower Congo Province but also on the Batéké Plateau and part of the Territory of Kenge (Bukanga Lonzo), to promote small-scale community and private agroforestry (from 1 to 50 ha) in the savanna.
- Component 4 ($US 4.2 million) concerns the project management by the FIP Coordination Unit, which also coordinates the Integrated REDD+ Project of Mbuji-Mayi/Kisangani.

The Dedicated Grant Mechanism (DGM). The DGM is conceived and developed as a special window under the FIP to provide grants to the Indigenous People and local communities. It is intended to enhance their capacity and support initiatives to strengthen their participation in the FIP and other REDD+ processes. The

project will start in 2017 and will be implemented over a five year period for $US 6 million and comprises 3 components:

- Component 1a ($US 0.5 million) is aimed at building capacities at the national level for strengthening indigenous people and local communities voices on land and forest policies, especially in regard to the recognition and promotion of Indigenous People rights.
- Component 1b ($US 1 million) will deploy enabling activities (trainings) to reinforce the indigenous people and local communities representation at the local level (territory) and increase the capacity of their organizations to participate in land planning and forest management.
- Component 2a ($US 2.1 million) will provide grants to communities to engage in alternative livelihoods or in making their current livelihood more sustainable. Its objective will be to demonstrate the capacity of indigenous people and local communities to implement micro projects and thus to benefit from the REDD+ projects.
- Component 2b ($US 0.5 million) is aimed at exploring innovative ways to secure indigenous people and local communities forest management activities and to recognize traditional governance systems. This will entail work on both the legal status of the land (protected areas and community forest concession) and on the governance system that will be established for managing users' rights, drawing on this last aspect on international experiences such as the Indigenous Pygmy Peoples and Community Conserved Areas and Territories (ICCA)
- Component 3 ($US 1.08 million) will increase the capacity to implement development activities and consolidate feedbacks.



Map 3: Drivers of deforestation and existing activities in the Mai Ndombe Province (Sources: WRI, FACET, CADIM, CIRAD – Design: E. Marino/WWF)

4.2 ASSESSMENT OF THE MAJOR BARRIERS TO REDD+

The barriers to REDD+ are primarily the difficulty encountered by all stakeholders to develop financially viable and competitive alternatives to deforestation and forest degradation, be it government, the private sector or local communities. These difficulties are due in particular to:

a. **Poverty**, lack of economic opportunities and access to credit; low access to capital for rural families, who are not in a position to take risks and initiatives to improve agricultural and production practices.

b. **The lack of upfront financing, incentives and knowledge transfer** to allow populations to develop agricultural or energy alternatives. For example, alternative cash crops take 3 to 5 years to generate income, energy plantations take at least 7 years. At present, there is no incentive to establish plantations, making sustainable charcoal production difficult. It is therefore necessary to provide steady income during the transition period.

c. **A weak business climate, which remains rather unattractive**, despite some recent improvements and unconducive to sustainable development and resource management projects. In particular, this limits the involvement of stakeholders in the value chains (processing, marketing etc.) for agricultural and wood products. This makes the development of perennial crops or the local processing of wood to generate revenues and employment difficult.

d. **Land tenure insecurity,** which not only compromises investment and sustainable and long-term land management, but also encourages the rapid and short-term exploitation of resources.

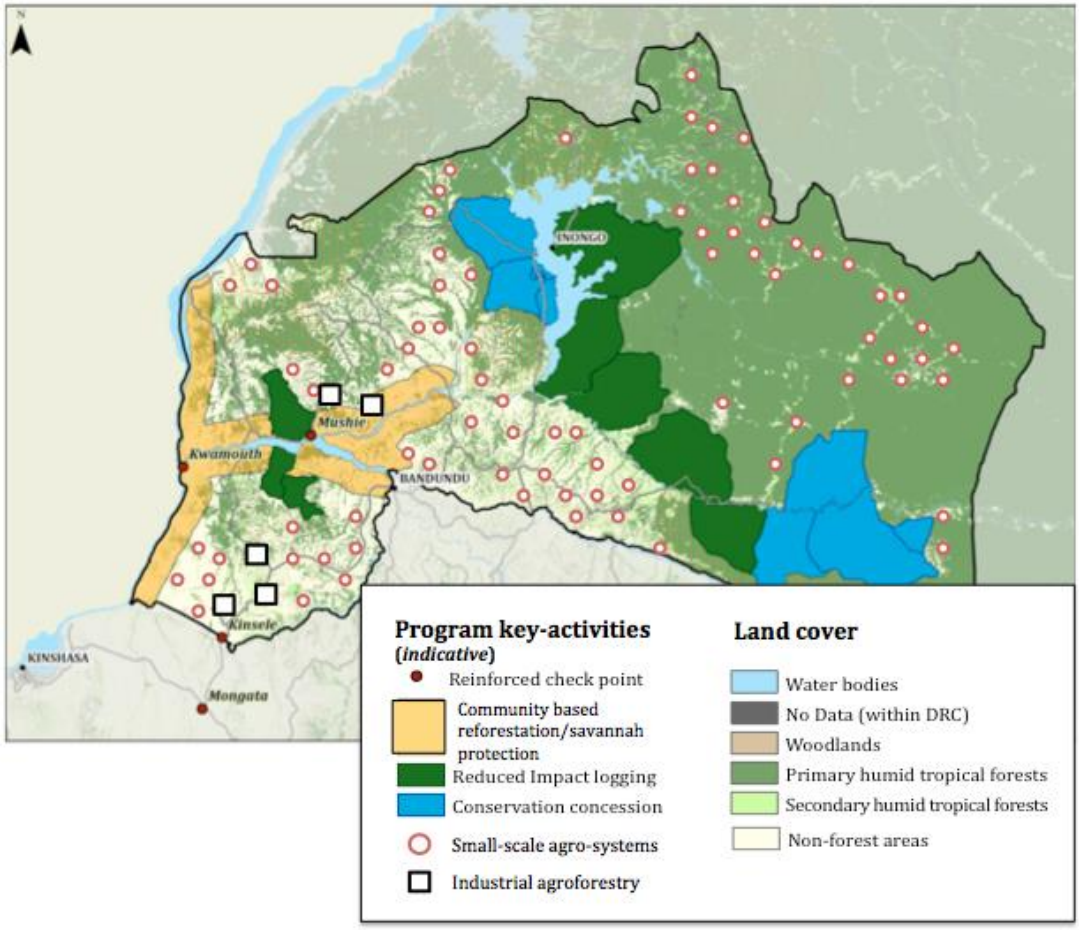
e. **Weak governance and lack of institutional capacity**, which prevents the transparent and rigorous enforcement of the Forest Code and environmental legislation. The lack of resources and technical capacity, in particular as regards traceability tools, is a major hindrance to law enforcement.

4.3 DESCRIPTION OF AND JUSTIFICATION FOR ACTION AND INTERVENTIONS PLANNED UNDER THE ER PROGRAM WHICH WILL LEAD TO REDUCTIONS OR THE REMOVAL OF EMISSIONS.

STRATEGIC VISION AND APPROACH TO GREEN DEVELOPMENT IN THE PROVINCE OF MAI-NDOMBE

The green development model of this program will be adapted to the strategic vision and to the dynamics at work in Mai-Ndombe. In particular, the province has the potential to offer a sustainable supply of fuelwood, lumber and agricultural products for the megalopolis of Kinshasa while at the same time increasing the incomes of local populations and maintaining significant forest cover.

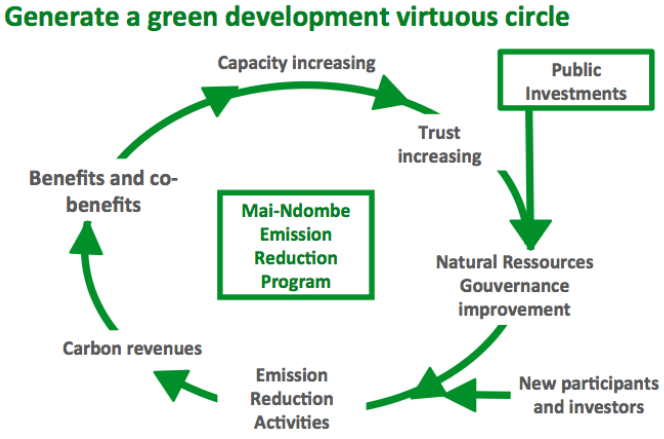
The program strategy will thus be geographically adapted and will lead to a land-use planning process centered around the sustainable development of natural resources and the clarification and protection of all stakeholders' rights (in particular local communities and indigenous people). This will involve (i) offsetting the demand for unsustainable wood products from the province-city of Kinshasa with reforestation and regeneration activities in the savannas and along the river, in particular in the Plateau district, (ii) orientating agricultural practices in the forests towards practices that are less land-consuming than fallow-slash and burn farming, such as perennial crops or agroforestry (iii) incentivizing the conservation and sustainable management of the forests.



Map4: Location scenario of key program activities (Design: E. Marino/WWF)

In order to achieve the objectives of the program (see Table 1) and to trigger the transformational effects necessary to accomplish such a transition, the program will adopt the approaches described in below. The program will support the consolidation of a governance framework for natural resources management in order to secure investment and deploy innovative and sustainable economic activities.

APPROACHES



- **A multi-sectoral strategy** combining direct investments and enabling activities**.**
- **Implementation of the program through local governance authorities** and councils at village and territory level in order to integrate REDD+ into local development policies.
- **A program of performance incentives** designed to encourage sustainable practices among communities and the private sector, in particular (i) large-scale reforestation and protection of the savannas (ii) conservation and sustainable management of the forests.
- **An innovative financing framework.** Public financing creates enabling conditions for the roll out of emission reduction activities. These activities generate carbon and non-carbon revenues, which help to incentivize the engagement of new stakeholders and investors.

EXPECTED TRANSFORMATIONAL EFFECTS

1. Thanks to the improvements in governance promoted by the program, the local and Provincial Authorities will take account of deforestation in their investment plans and in their political decisions relating to land use. In addition, land tenure conflicts will be more easily arbitrated by the consultation mechanisms and the land use participatory approach.
2. It will be in the interests of communities and entrepreneurs to adopt the rationale of a low level of deforestation defined by the agreed sustainable development plans (SDP) drawn up in a participatory manner. In fact, this rationale will produce direct revenues (investments in cultivation techniques and choices) and will make payments conditional upon performance.
3. The farmers will benefit from support, enabling them to make long-term efficiency improvements to their agricultural practices, to orientate their productive activities toward the savannas and thus to accept more readily the restrictions that will be imposed upon them regarding use of the forests.
4. The formalization of the commodity sectors (charcoal, wood, perennial crops etc.) will offer improved control of their legality and their impact on forest cover while at the same time guaranteeing populations and farmers an outlet for their products at stable prices.

Figure 1: Approaches and transformational effects expected of the Mai-Ndombe ER Program

APPROACHES AND STRUCTURE OF THE PROGRAM

The program will translate this vision into a **combination of enabling and sectoral activities in accordance with the 7 pillars of the national REDD+** strategy framework (See Table 6 below).

"Sectoral" activities are defined by the national REDD+ strategy framework as types of activity aiming to address the direct causes of deforestation and to generate measurable and verifiable emission reductions.

- In the case of the program, they seek in particular to reduce poverty and to make up for the shortfall in startup funding, incentives and knowledge transfer in order to develop agricultural, energetic and forestry alternative activities. (Removing the barriers a. and b. above).
- The sectoral activities **considered to be priority activities and the most relevant** in terms of addressing the drivers of deforestation and degradation are proposed by the program. Even though other activities may be introduced over the course of the program, this list provides a means of mobilizing financing and expertise within a clearly defined framework.
- The sectoral activities will be realized through direct investment, through payment by performance (proxy or carbon) and will be implemented by operators, be they communities, enterprises, associations or farmer organizations.

"Enabling" activities are activities that aim to create conditions favorable to the implementation of sectoral options, but which also offer a means of addressing certain underlying causes of deforestation and contribute to the sustainability of sectoral activities. They do not generate emission reductions or *a priori* non-measurable emission reductions (except on the basis of estimates relying on assumptions which must be clearly established and argued).

- Under the program, these activities will seek (i) to create a participatory framework for the management of natural resources focused on the definition and implementation of Sustainable Development Plan (SDP) in order to remove land tenure insecurity and to improve governance as well as political and administrative coordination; (ii) to build the capacities of the decentralized services to enforce regulations; (iii) to facilitate the development of the relevant economic sectors by supporting operators in the agricultural and wood sectors and; (iv) to apply the national family planning strategy in the Mai-Ndombe province (removing barriers c, d, e and f).
- The enabling activities will be realized through public investment and implemented by local executing agencies, NGOs and decentralized State services.

Table 6*:* Program structure and key activities

Pillars	**Sectoral activities**	**Enabling activities**
Agriculture	AS1. Agroforestry and improvement of cultivation techniques AS2. Perennial crops development in non-forest areas (coffee, cocoa, palm oil and rubber)	AH1. Strengthening agricultural value chains
Energy	ES1. Assisted natural regeneration for charcoal production. ES2.Afforestation/Reforestation for charcoal production	EH1. Formalization and strengthening of the fuelwood sector
Forest	FS1. Reduced impact logging FS2. Conservation of local community forests FS3. Conservation concession FS4. Afforestation/Reforestation for lumber production	FH1. Strengthening forest and wildlife law enforcement FH2.Legal compliance of industrial logging operations FH3. Development of community forestry. FH4. Support management of protected areas
Enabling *Governance, Population, Land-use planning and Land tenure*	H1. Capacity-building of decentralized State services H2. Multi-level capacity-building and Sustainable Development Plans design H3. Implementation of collective and strategic facilities H4. Family planning	

ENABLING PILLARS

In order to successfully roll out the key deforestation reduction activities and also to address the underlying causes of deforestation, the program will finance enabling strategies in terms of governance, land-use planning, land tenure and family planning. These activities will allow to test key reforms of the DRC in these sectors and inform the development of a provincial plan for the use of land and resources. The activities presented below constitute a combined multi-level support for populations and State services in order to create the necessary conditions for a transition towards sustainable development. The aim of the actions undertaken here is to strengthen significantly the institutions and the governance of natural resources in Mai-Ndombe.

In order to address land tenure issues (see also Section 4.4**),** the program's intervention strategy can be summarized as follows:

i) First, the program operates in the context of the national land tenure reform that will be implemented with CAFI funding (see Section 4.1). The reform will develop and implement in a participatory and transparent manner a land-tenure policy that is equitable and clarifies tenure rights. This national process is very beneficial for the program, in particular with a longer-term perspective.

ii) Second, in the short term, the program will address tenure issues by strengthening Local Development Committees at community level and CARTs at territory level, by creating a participatory framework for the management of natural resources focused on the definition and implementation of Sustainable Development Plan (SDP) that remove land tenure insecurity and by improving political and administrative coordination and building the capacities of the decentralized services (see enabling activities H1-H3). Tools and methods will be tested in the ER Program and nurture the land tenure reform at national level.

- **H1. Capacity-building of decentralized State services.** This activity includes: i) participation of government services (Environment, Agriculture, Interior, Land Registry),in the Provincial REDD+ Steering Committee, territorial consultative platforms (CART)[19],and in the monitoring and evaluation of the program ii) enforcement of the regulation of logging and charcoal operations, iii) training of the agents involved in the project activities and in particular those set out below involving support for land-use planning.
- **H2. Multi-level capacity building and Sustainable Development Plans design.** The aim of this activity is to strengthen the associative structures at community level (Local Development Committees) and territory level (CART), Sustainable Development Plans (SDPs) for Natural Resources will be established or updated in order to formulate a sustainable vision of the use of natural resources and investment needs at each level of administrative and community organization. Such an approach for delineating customary *terroirs*[20]will also occur within and around the forest concessions, thereby supporting the process - currently under development - of forest concession management plans. This activity will involve a certain number of steps: awareness raising, community structuring, participatory mapping for identification of all users rights and establishment of SDP at the various implementation levels. These steps are detailed in the figure below. A fair participation of all the users of the *terroir* will be ensured. The Sustainable Development Plans developed at the community and/or CART levels will then be:
    i. Approved by the Territory Administrator and by the land affairs services, thereby ensuring the enforcement of the process for future investments (See Section 4.4);
    ii. Compiled at provincial level and included in the definition of a provincial development plan that will prioritize future activities and investments.
    iii. Used as the basis for the signature of contracts for SDPs implementation**,** in particular on the basis of actions and projects proposed by local stakeholders and other external project holders.

[19] CART members are: representatives of the Territory Administration, including the Administrator, President of the CART, the Technical Departments of Agriculture, Environment, Land Registry, the law enforcement agencies, all Sector and Chiefdom chiefs, representatives of the customary Chiefdoms and of the Land and Group Chiefs, of the Indigenous Pygmy Peoples, of the Sector CARTs, women's associations, farmers, fishermen, the international and local NGOs operating on the project in the zone and representatives of church organizations. See Section 6.1.

[20] A *terroir* is defined as a land area under the customary management of 1 Land Chief.

- **H3. Implementation of collective and strategic facilities** programmed in the plans, on the basis of the preliminary programming done in the Territory workshops during missions to draft the Plateau and Mai-Ndombe investment programs.[21] The main strategic roads and bridges in the Province will be maintained. Processing and storage equipment for agricultural products, managed by cooperatives and private operators, will be put in place in order to reduce the value chain costs and to secure them.
- **H4. Family planning.** This activity seeks to achieve the Family Planning objectives set out in the National Strategic Plan for Family Planning (Ministry of Public Health, 2013). It will be conducted in close synergy with the Ministry of Public Health and plans to reach 20% of women of childbearing age (awareness raising among men and women, supply of contraceptives, monitoring and evaluation). A detailed strategy will be developed as soon as the program starts.

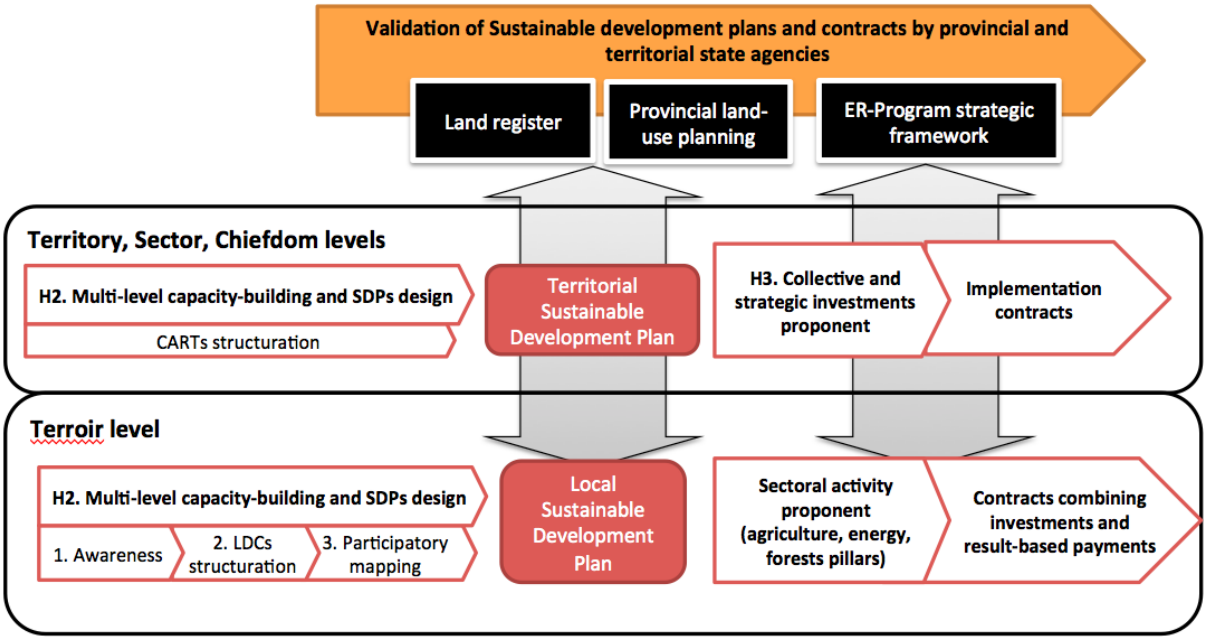


Figure 2: Participatory land-use planning and investment securing process

AGRICULTURAL PILLAR

A. Sectoral strategy

Slash-and-burn farming is the main cause of deforestation, as explained in Section 4.1. In order to address this important driver, the program strategy is to promote agriculture in the savanna and to make agriculture in forest more sustainable. This strategy will allow (i) to generate higher incomes for households and small farmers and (ii) to reduce the surface area cultivated under slash and burn practices while reducing the associated deforestation. These objectives will be pursued by a variety of means, such as: i) diverse forms of training (initial, field school etc.), ii) Up-front finance and supply of inputs, and iii) result-based payments. Support in value chain downstream will be a decisive factor in guaranteeing stable incomes for the various households and farmers involved. To achieve this, the program will seek to work

[21] PAB/ISCO/EU projects and BioCFplus mission in the district of Mai-Ndombe.

with private operators and establish co-financing arrangements with them. The program will also establish partnership with institutional or private organization interested in supporting sustainable landscape management initiative as Tropical Forest Alliance, Verified Carbon Standard and Global Canopy program.

B. Medium-term vision and sustainability

Through a combination of investment and result-based payments, the program will encourage households and small farmers to cultivate the savannas rather than the forests and to reduce slash-and-burns in forest areas. The non-carbon revenues[22] generated by agricultural diversification will be an incentive to maintain these sustainable agricultural practices over the medium- to long-term. Investment in value chain facilities will help to attract professional operators who will be responsible for maintaining price stability, high product quality and compliance with strict specifications relating to the reduction of deforestation and degradation of forests. Those facilities and small factories that will be settled overtime to transform agricultural products will be a key strategy of poverty reduction and job creation.

C. Key sectoral activities

AS1. Agroforestry and improvement of cultivation techniques

Description	The program will support the development of small-scale agroforestry models that will help to ensure food security for households while at the same time generating additional incomes from the sale of agricultural and wood products. The program will promote agroforestry systems that offer a good mix of short-cycle crops with real potential for penetration into urban markets, in combination with energy trees such as acacia, fruit trees, moringa and other legumes and caterpillar bearing trees. The trees planted might be acacia for energy or fruit trees (mango, avocado, safou etc.). The combination of short-cycle crops and reforestation will allow households and farmers to generate additional incomes in the short term until the trees start to generate revenues. The development of agroforestry systems will go hand-in-hand with improvements in cultivation techniques for short-cycle crops (cassava, maize etc.). The main improvement involves dissemination of improved varieties, foremost among these being cassava as this has a potential for sustainable improvement of 30 to 40% per year. The distance of cultivated parcels from all-weather roads and navigable waterways and existing knowledge will be taken into account in the choice of agroforestry systems. This activity will often be associated with the protection of savannas in order to protect the agroforestry parcels from fires while at the same time reconstituting the forest in savanna areas (See ES1.). The program will fund nurseries to supply improved seeds and performance incentives for the establishment and maintenance of the parcels.
Key results targeted after 5 years	✓ 13,000 ha of agroforestry ✓ 50% of vegetation material renewed ✓ $3,000 in non-carbon revenues generated per ha ($10,000 after 10 years)
Operators/beneficiaries	Households and small farmers
Potential partners	ICRAF, GI-AGRO, CTB, local NGOs

[22]The average for agroforestry and perennial crops is approximately $700/ha/year.

AS2: Perennial crops development in non-forest areas (coffee, cocoa, palm oil and rubber)

Description	The previous activity which seek to develop intensively agroforestry in savannas is mainly possible in the district of Plateau and certain areas of Mai Ndombe where savannah are big enough. It is therefore necessary to develop alternatives for forested areas. The development of perennial crops has been identified as a relevant strategy to provide economic opportunities, reduce the labor available for slash and burn farming and hence reduce the cultivated surface area[23]. The perennial crops will be developed primarily in the district of Mai-Ndombe by focusing on the rehabilitation of former coffee and cocoa plantations. In the savanna, the program will also develop (i) palm oil plantations in combination with agroforestry. Palm oil will be mainly produced to meet the local and Kinshasa demand, which is increasing; and (ii) rubber plantations that will produce latex and wood. Combinations of subsistence crops and short-cycle income crops (see AS1) will be prioritized in association with perennial crops (plantain banana, for example). The program will co-finance the inputs and a proportion of labor costs for establishment and maintenance during 2 years.
Key results targeted after 5 years	✓ 6,000 ha of perennial crops in savannas ✓ 6,000 ha of perennial crops in degraded lands ✓ $1,500 in non-carbon revenues generated per ha ($5,500 after 10 years)
Operators/beneficiaries	Households and small farmers. One objective will be to create a professional class of small farmers who will be organized into producer associations by type of crop.
Potential partners	• Administration: MINAGRI Provincial Ministry of Agriculture • Technical and financial partners: The NGO TRIAS, CTB and IFAD • Private sector: Café Africa, Forest Carbon Group/Forest Finance

[23] Proposal for a REDD+ integrated project for Mai-Ndombe- BioCarbonFundplus – April 2015 - Rodriguez, Kashimba, Ipanga.

Key enabling activities

AH1. Strengthening agricultural value chains

Description	The sustainable development of perennial crops can only be achieved with the simultaneous emergence of organized and professional channels. To achieve this, the program will draw on and strengthen the existing channels and stakeholders (the company Congo Forêt (rubber), the NGO Trias (Cacao)) but will also seek to organize and develop new partnerships in order to ensure constant demand, a prerequisite for the farmers to really re-engage in this sector. The program will therefore seek (i) to attract experienced buyers, (ii) to construct or repair storage and processing facilities, (iii) to create buying agencies at strategic points, (iv) to support the development of product certifications and in particular to guarantee that the development of perennial crops is not exacerbating deforestation.
Key results targeted after 5 years	Professional operators are in place through all perennial crops value-chain, contributing to the maintenance of price stability, high product quality and compliance with strict specifications relating to the reduction of deforestation. (Zero Deforestation production standard)
Operators/beneficiaries	Professional operators: i) cooperatives and associations of planters, ii) large private operators already active in the zone and iii) specialized private companies already operating in the DRC or elsewhere.
Potential partners	• Administration: MINAGRI. Provincial Ministry of Agriculture • Technical and financial partners: The NGO TRIAS, CTB and IFAD • Private sector: Café Africa, Forest Carbon Group/Forest Finance

ENERGY PILLAR

A. Sectoral strategy

In order to respond to the ever-increasing demand in Kinshasa for fuelwood, the energy strategy of the program will primarily consist in supporting reforestation and regeneration for energy purposes in order to rapidly grow a sustainable fuelwood offer and to reduce pressure on forest spaces (this also constitutes a key leakage reduction strategy).

B. Medium-term vision and sustainability

After an initial production cycle, the communities and private stakeholders will draw significant revenues from their charcoal production and will be encouraged to maintain this activity in combination with agriculture. Furthermore, the formalization of the sector will help to disseminate good practices and standards among the various stakeholders. In the medium term, a "sustainable charcoal" value-chain will be formed and supported either by a favorable tax regime or by promoting the sustainable origin of their product among consumers in Kinshasa. Non-sustainable charcoal, this will be taxed progressively, supporting the transition toward sustainable charcoal production across the province. The revenues from these taxes will be used to consolidate funds dedicated to reforestation and ensure the long-term sustainability of the system.

C. Key sectoral activities

ES1. Assisted natural regeneration for charcoal production.

Description	This activity consists in establishing and maintaining fire breaks in order to encourage the regeneration of forestry-dedicated savanna and thus help (i) increase carbon stocks, (ii) develop a sustainable charcoal offer in the short term and (iii) create a cost-effective leakage mitigation mechanism linked to fuelwood. Incentives per hectare will be proposed for firebreaks establishment and maintenance. In addition to protecting neighboring forests from the spread of savanna fires, the activity will offer a means of providing a sustainable supply of charcoal. The regeneration zones will be incorporated into the local natural resource management plans and the program will focus this activity on the district of Plateau, in particular along the Rivers Congo and Kasai in order to facilitate the transportation of the charcoal produced. After charcoal production of one parcel, the land can be used for farming, thus reducing pressure on the neighboring forests.
Key results targeted after 5 years	✓ 50,000 ha of Assisted Natural Regeneration dedicated to fuelwood ✓ $700 in non-carbon revenues generated per ha ($2,200 after 10 years) ✓ 900,000 tons of charcoal produced over 10 years (replacement of approximately 40% of the charcoal offer in Mai-Ndombe)
Operators/beneficiaries	LDCs, households, small farmers, specialist NGOs or private operators
Potential partners	Hanns Seidel Foundation, CIRAD

ES2. Afforestation/Reforestation for charcoal production

Description	Energy plantations will be planted in the large grassy savannas (requiring no stump removal) close to roads in the vicinity of Kinshasa, in particular in the south of the territory of Kwamouth. This activity can be conducted with inter cropping for the first 2 to 4 years in order to generate revenues. After 7 years, trees can be failed to make charcoal. The program will co-finance

	professional operators (private enterprises, cooperatives) up to 50 to 60% of total investment and maintenance costs, which will vary between $800 and $1,000 per hectare according to site and type of sylvicultural. Co-financing will be conditional upon performance, in accordance with modalities, which are yet to be defined.
Key results targeted after 5 years	✓ 3,000 ha of industrial agroforestry reforestation. ✓ $1,400 in non-carbon revenues generated per ha ($3,000 after 10 years) ✓ 50,000 tons of charcoal produced over 10 years (replacement of approximately 2% of the charcoal offer from Mai-Ndombe)
Operators/beneficiaries	Professional operators: i) cooperatives or associations of planters, ii) specialist private companies already operating in the DRC or elsewhere. ➢ *Identified operator: Novacel, a specialist agroforestry company, in association with the Nsia Mala Mala cooperative currently being set up in South-Kwamouth*
Potential partners	Hanns Seidel Foundation, European Forest Institute, `New Generation' Platform, Mondi

D. Key enabling activities

EH1. Formalization and strengthening of the fuelwood sector

Description	This sector support activity will be structured around the following focuses: i. Improving the efficiency of fuelwood production by introduction efficient and low-cost technologies, building technical and regulative capacities and putting monitoring tools in place. In synergy with the design of Sustainable Development Plan at terroir level, activities will support charcoal makers and other stakeholders in the sector by disseminating sustainable charcoal production practices. Synergies can be found with the development of improved cookstoves in Kinshasa (planned in component 2b of the FIP), in order to accommodate charcoal quality and cookstoves design. ii. Developing a network for the transportation, distribution and marketing of sustainable fuelwood; iii. Contributing to the formalization of the fuelwood sector in the province of Mai-Ndombe through fiscal measures encouraging sustainable practices and discouraging practices that are harmful to the environment.
Key results targeted after 5 years	✓ A legal framework and technical standards for sustainable charcoal are defined. ✓ 5 to 10 cooperatives of producers/carriers are created;
Operators/beneficiaries	Professional operators: i) cooperatives or associations of producers, ii) specialist private companies already operating in the DRC or elsewhere.
Potential partners	CIRAD, SNV

FOREST PILLAR

A. Sectoral strategy

The strategy of the program in the forest sector is based on two complementary axes of production and conservation.

First, in order to reduce deforestation and forest degradation due to industrial and artisanal logging while at the same time satisfying demand for domestic and international markets, the program will support: (i) industrial forest companies, to adopt reduced impact logging practices, comply with national regulation requirements; (ii) professional and community organizations, to reforest local species in order to offset at a medium-run the local and Kinshasa demand for wood; (iii) forest law enforcement.

Then, in order to promote the conservation of forest carbon stocks, the program will support (i) the creation and operation of conservation concessions, (ii) the conservation of local community forests and (iii) the management of protected areas.

The program offers the opportunity for forest companies to be compensated for their effort in reduced impact logging or extending conservation area, but this opportunity is limited to concession which are already advanced in their forest management process (See Annex 7). Support will be provided to companies that choose to engage in the program and commit to greater legal compliance. In parallel, forest controls by the state will be reinforced, and sanction will apply to concessions that are not progressing toward legal requirements. Transparency and monitoring will be the key of this strategy to bring the forest sector on track to Sustainable Forest Management.

B. Medium-term vision and sustainability

- The first activities of reduced-impact logging with pioneer forest companies will help to demonstrate the effectiveness of this type of management and will gradually cover all concessions. This gradual dissemination of sustainable practices will bring significant opportunities for the logging sector; first economically, by rewarding low-impact practices, but also commercially as participation in the program will help to foster greater confidence among commercial export partners especially through certification.
- Forest concessions' compliance with REDD+ objectives will be monitored annually (See Annex 7). Companies, which commit to improving their practices and compliance with the legal framework, will be able to benefit from enabling support from the program. Greater scrutiny over companies' activities and incentives to improve business practices will restore the level playing field and bring companies to a level at which they will be able to build credible REDD+ activities
- Conservation concessions development is an intermediary strategy to give values to forest and provide local development in a context of increasing forest destruction. Conservation concession will be at a later stage (when the economical and regulative context will be improved) subject to other economical vocation as sustainable forestry, NTPF activities, and ecotourism.
- The resources made available to the State for controlling the legality of wood transported and for controlling compliance with management plans and standards will contribute to a substantial reduction in illegal and semi-industrial logging, and will help to formalize the small-scale sector. The taxes and fines collected through the control system will in part be re-channeled towards sector formalization and reforestation for wood production.

- The program will gradually implement a payment system for environmental purposes, intended for both conservation concessions and community forests. This system will be financed at a medium-run by a provincial or national revolving fund, built up with carbon revenues or some other fiscal arrangement at national level.

C. Key sectoral activities

FS1. Reduced impact logging

Description	The objective of this activity is to reduce the impact of logging by the following measures: reduction of the length and width of the primary and secondary roads, improved planning of extraction paths, extension of conservation areas and reduction of storage areas, increased duration of rotation and of minimum felling diameters etc. By providing monetary incentives to reduce the emissions generated, reduced-impact logging practices remains profitable and attractive for the private sector. The forest concession holders will thus be subject to a carbon performance-based regime linked to a specific reference level calculated on the basis of their management plans (or development plan where applicable). This support from the program will be conditional to the compliance of concessions with the minimum threshold of the REDD+ Standard for logging companies. (See Annex 7). The program will also encourage progress of the forest companies toward certification scheme (FSC or others) and this to ensure sustainability of the system if the Carbon Fund payments are not available anymore after 2021.
Key results targeted after 5 years	✓ 25% of the concessions of Mai-Ndombe engaged in reduced-impact logging (More than 80000 ha logged with reduced-impact logging standards over the 5-years period)
Operators/beneficiaries	Industrial timber companies - SODEFOR, SIFORCO and Maison NBK have already declared their interest in participating in this activity.
Potential partners	FRM, GFA

FS2. Conservation of local community forests

Description	This activity consists in providing direct incentives for the conservation of local community forests in line with the local sustainable development plan developed by communities in a participatory manner. This activity will be conducted in synergy with the other alternative activities in the savannah and those involving agricultural intensification targeting village land parcels. It will offer an incentive to rights holders to improve their management of the allocation of forest parcels for charcoaling or non-sustainable agriculture in favor of conservation of community forests. These direct revenues will supplement household incomes and finance collective investments. Payments will be performance-based in accordance with modalities that are still in detailed design and that will be tested during the first years of the program. A portion of these forests might be formalized into local community forests, thereby enabling the implementation of the recent decree. Controlled logging will therefore be tested and then extended to other community concessions (see FH3). Historical contribution of indigenous people and local communities to the conservation of the forest should be acknowledged and accounted for. Existing sustainable governance

	systems of forest management should be identified and given recognition, using, among others, international experiences such as ICCA (see DGM component 2b).
Key results targeted after 5 years	✓ More than 500 000 ha of local community forests under conservation
Operators/beneficiaries	LDCs and/or CARTs and/or DGM governance bodies
Potential partners	Local civil society

FS3. Conservation concession

Description	By offering carbon incentives, the conversion of logging concessions into conservation concessions is rendered profitable and thus attractive to the private sector. The program will reward the carbon performance of existing conservation concessions and will facilitate the creation of new conservation concessions. The concession holders will develop activities with the communities, who must ideally incorporate the various key activities of the program into their management plan (agroforestry, perennial crops, reforestation, family planning etc.). This support from the program will be conditional to the compliance of concessions with the minimum threshold of the REDD+ Standard for logging companies. (See Annex 7).
Key results targeted after 5 years	✓ 2 conservation concession (Around 300,000 ha)
Operators/beneficiaries	Conservation companies (WWC) Industrial timber companies (SODEFOR, SIFORCO, SOMICONGO and Maison NBK)
Potential partners	PERMIAN Global

FS4. Afforestation/Reforestation for lumber production

Description	The program will facilitate and assist private operators in the establishment and management of industrial lumber plantations for the local and regional lumber market (construction, manufactured products etc.). This activity will participate in carbon sequestration but will also help to secure sustainable sources of lumber supplies for industry in Kinshasa and the sub-region. In the medium term, local timber processing activities will contribute to increase local employment and reduce poverty. The program will co-finance professional operators (private enterprises, cooperatives) up to 50 to 60% of total startup and running/management costs, which will vary between $800 and $1,000 per hectare according to site and type of sylvicultural. Co-financing will be conditional upon performance, in accordance to modalities, which are yet to be defined. The program will encourage the development of agroforestry system in order to diversify revenues streams and contribute to increase food security. The program is currently in discussion with the company SOCALCO, leader in the matches production sector based in Kinshasa, in order to offset their unsustainable wood sourcing by establishing agroforestry system.
Key results targeted after 5 years	✓ 10,000 ha of industrial agroforestry for lumber production

Operators/beneficiaries	Professional operators: i) cooperatives or associations of planters, ii) specialist private companies already operating in the DRC or elsewhere. ➢ *Identified operator: Company SOCALCO (Dewji International Group) has expressed its interest in this activity*
Potential partners	ICRAF, New Generation Platform, Mondi

D. Key enabling activities

FH1. Strengthening forest and wildlife law enforcement

Description	The objective of this activity will be to strengthen forest and wildlife law enforcement in the Mai-Ndombe program zone, in particular: (i) control of the logging products derived from small-scale and industrial logging, (ii) control and taxation of charcoal and (iii) control of poaching and animal traffic; To achieve this, it will rely on the decentralized service of the Ministry of Environment and on the Department of Internal Control and Audit (DCVI) within that Ministry. This activity will involve strengthening these services to give them the capability to carry out the tasks concerned. This will be carried out (i) at territory level to strengthen the teams responsible for controlling and sanctioning industrial and small-scale operations, as well as poaching; and (ii) at key crossing points (Mongata, Kinsele, Mushie and Kwamouth) in order to strengthen the control system, by providing it with the means to detect infringements and apply the regulations on contravening products, and also to determine clear statistics on the exploitation and trading of forest resources in the province of Mai-Ndombe. The Program management unit will supervise the activity and will draw on independent mechanisms (civil society, independent observers) responsible for verifying the effectiveness of the checkpoints and the correct application of management measures. Serious consideration will be given to the option of channeling the revenues generated from the various taxes to reforestation for energy and wood production purposes. As part of these activities, the AGEDUFOR project will be able to train DCVI officials. Other enabling activities could be envisaged in order to improve the training of MEDD and provincial departmental personnel on the performance of their tasks of supervising, managing and controlling forest activities.
Key results targeted after 5 years	✓ 4 reinforced check points at all the crossing points leading to Kinshasa ✓ More than thirty agents trained and reinforced in terms of resources and equipment.
Operators/beneficiaries	State Services (environnement territorial unit, DCVI etc.)
Potential partners	AGEDUFOR project (AFD)

FH2. Legal compliance of industrial logging operations

Description	The legal compliance of forest concessions and their integration into the management planning process often comes up against the problem of financing the collection of the basic data required for the preparation of the various management planning documents required, lack of capacity of companies and difficult business climate in the DRC. At present, only three concessions (held by the same company) have elaboratedtheir Forest Management Plan. A large number of concessions, therefore, are or will be late in this management process.Support in the form of technical assistance and financing will be necessary in order to finalize this management planning process, as well as support companies in complying with their social obligations. Contracts with concession holders and consultancies specialized in forest management planning (or with the management planning units of companies if they are operational) to cover a part ofthe management planning costs (cost of the inventory borne by the holders). Initial support in terms of forest management is also planned. It concerns the production of the first management plan and the first annual operations plan, as well as technical assistance for the monitoring of forest production and social provisions. This activity will be developed in close interaction with the AGEDUFOR project that will provide training and technical support to forest holders in their forest management planning process. This support from the program will be conditional to the compliance of concessions with the minimum threshold of the REDD+ Standard for logging companies. (See Annex 7).
Key results targeted after 5 years	• An additional 400,000 ha of forests under concessions inventoried • 50% of forest concessions submitted their Forest Management Plan.
Operators/beneficiaries	Industrial Timber Companies
Potential partners	MEDD, AGEDUFOR, FRM

FH3. Development of community forestry.

Description	This activity will support the creation and management of forestry concessions for local communities at a sufficiently large scale (consortia or clusters of adjacent community concessions, for example) that would be managed and exploited in collaboration with artisanal loggers themselves in a more effective structured and supervised. Exploitation contracts will then be negotiated with the communities holding the concessions, including, among other things, an equitable benefit-sharing mechanism and procedures for the monitoring and control of the operation. An important precondition to the allocation of a community forest will be the fair and participatory identification of rights and rights holders. This is a crucial step, particularly for IPP, whose customary and user rights are often threatened or simply ignored by other groups in a context of increasing competition for land. During the consultation process preceding the attribution of a community forest concession, the program will ensure that IPP are given the appropriate means to be consulted effectively and freely.

	Another important precondition for the success of this activity is the structuring and strengthening of local communities and artisanal loggers who will participate in the initiative. This activity will draw on the experiences of community forestry in the DRC, in particular the GIZ project in Maniema.
Key results targeted after 5 years	✓ 3 community forest concessions under sustainable management (50,000 ha each on average) – Representing a volume of 50 000m3 per year and 20% of the current importation of artisanal wood from Mai-Ndombe[24]
Operators/beneficiaries	LDCs/CARTs, DGM governance bodies and associations of artisanal-loggers
Potential partners	GIZ, CIRAD

FH4. Support management of protected areas

Description	This activity will support the management of protected areas in the zone, in order to provide equipment and human and financial resources to the manager of the reserves concerned, but also to involve and raise awareness among communities with regard to protection activities. This activity will be conducted in close synergy with the activities that support communities in the development of local land-use plans and plans for investment in the agricultural sector.
Key results targeted after 5 years	✓ 4 units of eco-guards trained and reinforced in terms of resources and equipment.
Operators/beneficiaries	Support for the management of protected areas will be delivered by the WWF under CAFEC funding.
Potential partners	ICCN

PAYMENT FOR ENVIRONMENTAL SERVICESMECHANISM

The financing of the program requires significant up-front investments in order to launch the enabling activities that are essential to the success of the program, but also to invest in sectoral activities until these activities start to generate carbon and non-carbon benefits. The sectoral activities presented above are all directly linked to the emission reductions generated. Most of these activities will be included in a Payment for Environmental Services (PES)[25]mechanism with the operators and communities. This

[24] Lescuyer G, Cerutti P.O, Tshimpanga P, Biloko F, Adebu-Abdala B, Tsanga R, Yembe-Yembe, R.I and Essiane- Mendoula E. 2014. The domestic small-scale sawing market in the Democratic Republic of Congo: State of play, opportunities, challenges. Occasional Paper 110. CIFOR, Bogor, Indonesia.

[25] Karsenty defines a Payment for Environmental Services (PES) as "remuneration of an agent for service done to another agent (in time or space) through an intentional action to preserve, restore or increase agreed environmental service." Karsenty describes 2 main characteristics for this PES: (i) they result from a voluntary agreement between parties, that is, they are based on contracts, express or implied, that define the expected service and the corresponding payments; (ii) Payments are dependent on the realization of the service by recipients".

mechanism will rely on contracts and participants will be paid based on carbon performance or according to simplified indicators approximating the carbon performance (proxy indicators).

This PES mechanism will be available throughout the jurisdiction under the responsibility of the Program Management Unit and the Provincial REDD+ Steering Committee, which will ensure the harmonization of practices and procedures. It is designed to particularly facilitate access to the related benefits by small scale producers, Indigenous Peoples and local communities organized in a responsible, transparent, accountable and a legitimate way.

Even though the present structure of the strategy divides the activities into enabling and sectoral pillars, the strategy for intervention in local communities will be fully integrated.

- The communities will be supported in the preparation of a participatory mapping and a sustainable development plan (or land and natural resources management plan);
- This step will form the basis for the definition of the suitable sectoral activities (agroforestry, perennial crops and assisted natural regeneration) at the terroir level;
- The sectoral activities will be deployed through contracts combining investment and result-based payments. Clear conditions of participation and predictable payments will be defined to facilitate the voluntary participation. Collaborations between communities, NGOs, private sector and other will be encouraged and contracts will clearly stipulate periods of payments, the amounts and the evaluation criteria for result-based payments;
- The results-based contracts will provide a guarantee that the communities are indeed reducing deforestation on their land (the investments will be linked partly to observance of the land management plan).

Contracts will be signed with certain operators and communities that are already committed and structured under existing pilot initiatives. These contracts will be honored in the first few years through the initial investments, such as those of the Forest Investment Program. To ensure the sustainability of the PES mechanism, the program will ensure to re-allocate a share of the REDD+ revenues when carbon emissions are measured and audited and Carbon Fund payments can be accessed. For the various key activities, the table below presents the targeted operators and the basis for payments. Details of the standard contracts are given in Section 15.1.

Table 7*:* Targeted operators and basis for payments for each key activity

Key activities	**Environmental services**	**Targeted operators**	**Basis for payments envisaged**
AS1. Agroforestry and improvement of cultivation techniques	Sequestration and reduction of def/deg	LDCs, households and small farmers	Investments and performance-based incentives for maintenance
AS2. Perennial crops development in non-forest areas	Sequestration and reduction of def/deg	LDCs, households and small farmers	Investments and performance-based incentives for maintenance
ES1. Assisted natural regeneration for charcoal production.	Sequestration and reduction of def/deg	LDCs, households and small farmers	Investments and performance-based incentives for maintenance

ES2.Afforestation/Reforestation for charcoal production	Sequestration and reduction of def/deg	Professional organizations	Up to 50% co-financing with a private stakeholder paid on a performance basis
FS1. Reduced impact logging	Reduction of degradation	Professional organizations	Carbon performance-based payment
FS2. Conservation of local community forests	Reduction of deforestation and degradation	LDC	Result-based payments on the basis of contracts with the LDCs (to be defined)
FS3. Conservation concessions.	Reduction of deforestation and degradation	Professional organizations	Carbon performance-based payment
FS4. Afforestation/Reforestation for lumber production	Sequestration and reduction of def/deg	Professional organizations	Up to 50% co-financing with a private stakeholder paid on a performance basis

STARTUP STRATEGY

In its design, the program identified a certain number of priorities while taking account of the need to address all the drivers of deforestation and forest degradation in a coordinated way. The various funding have been allocated in order to assign sufficient resources to packages of activities that generate pilot successes that will encourage the various stakeholders to adhere to the principles and strategic framework of the program. The various implementation risks[26] and potential benefits have been taken into account throughout the design phase and allocation of the associated budgets. The program will therefore seek to respect the following startup principles:

- The program will prioritize its efforts and investments in the zones where initiatives are already present and/or where there is a high risk of forest cover reduction, along the major roads and waterways in particular.
- In order to guarantee that perennial crops are not developed to the detriment of the populations and forests, an in-depth study is under way to identify the most suitable zones for the development of perennial crops.[27].
- In 2016, the program will roll out a breaking-in phase involving training and demonstrations of referential agricultural techniques together with the most effective approaches of engagement, mapping and local governance strengthening. To accomplish this, significant resources and local monitoring and evaluation will be deployed in the first pilot terroirs, which will receive support and investments in order to disseminate lessons learned, to train future trainer and to exponentially roll-out the program activities.
- Iteratively, the program will ensure (through internal quality controls) that the level and quality of the upstream enabling activities are sufficient to achieve the objectives of the downstream sectoral mitigation activities.

[26] The analysis of the risk of non-permanence and of leakages is detailed in Sections 10 and 11.

[27] Siting-Tool developed by the SNV.

- From the outset, the program will place emphasis on strengthening forest control in order to put a significant brake on illegal logging operations, thus increasing confidence among the various stakeholders and guaranteeing that the efforts of some are not in vain due to the illegal actions of others.
- From the outset, the sectoral activities will aim to generate revenues for the populations, thereby increasing confidence and broadening the dissemination of these techniques. With this aim, the program has already established partnerships with the academic and research world in order to refine the various agroforestry and agro-ecological models that are adapted to environmental conditions and to local and regional market opportunities.
- The program will ensure the availability of sufficient resources and appropriate conditions to build the capacities of the various stakeholders, from the communities to the national and provincial authorities, in order to guarantee their participation, transparency and the effectiveness of the program activities.

4.4 EVALUATION OF LAND TENURE SYSTEMS AND ACCESS TO RESOURCES IN THE PROGRAM ZONE

LAND TENURE IN THE ACCOUNTING AREA

A number of studies exist on land tenure and access to resources in DRC, with a particular focus on REDD+.[28] The program zone, the province of Mai-Ndombe, in particular, was closely assessed with respect to land tenure aspects as part of the project for improved management of forest landscapes (PIMFL) funded by the FIP. Furthermore, independent assessments were conducted by the various REDD+ initiatives implemented in the program zone. The legal assessments were complemented with statistical samples (district of Mai-Ndombe; sample of 400 households), collected in the context of the BioCarbon Fund+ mission of November 2014, and on-the-ground surveys made by the Provincial Ministry of Agriculture (Bandundu) (2011) in the 4 territories of Plateau District.

SETTING THE SCENE: LEGAL TITLE AND USAGE

The Congolese land tenure regime has evolved on the basis of two constitutional guarantees: a public (state) guarantee of permanent sovereignty over the country's lands, waters and forests (recognized under the current constitution, which dates from 2006, in article 9), on the one hand, and the private property guarantee, which includes individual property as well as collective property, established in accordance with statutory law or custom (article 34 of the 2006 Constitution), on the other hand.

Within these constitutional guarantees, Congolese law defines and recognizes different property titles over movable and immovable objects as well as distinct resource tenure regimes. The key legal texts implementing both constitutional guarantees in practice are the Property Law of 1973 ("Régime général des biens, régime foncier et immobilier et régime des suretés" of 1973, hereinafter "Régime foncier" or "RF"), on the one hand, and the Forestry Code of 2002, on the other hand. The two laws are

[28] Mpoyi/Sakata/Longbango/Kabue, REDD+ en RDC, Cadre juridique et institutionnel de mise en oeuvre de la REDD+ en RDC (GLOBE International 2013); Mpoyi/Nyamwoga/Kalasi/Mulenda, Etude sur le partage des revenus issus de la REDD+.

complementary to each other: the Property Law, an instrument of private law, clarifies the concept of ownership and defines the conditions for the creation and transfer of ownership and other rights in rem ("droits réels") over movable and immovable objects; the Forestry Code of 2002, an instrument of public law, defines rights and rules of behavior for state and non-state actors with respect to a particular immovable object owned by the state: forest land. Both laws make specific provision for Indigenous Pygmy Peoples by recognizing customary land holdings ("domanial land" (terres domaniales) in the terminology of the Property Law).

The Property Law stipulates what constitutes "land" and its belongings. Land is considered a genuine immovable object (article 6 RF). "Trees and all plants" are considered components and, thus, are an integrated part of immovable objects, as long as they are not removed from the land; so are fruits and harvests (article 7 RF). Ownership of an object, whether movable or immovable, gives the right to all its physical components (article 21 RF).

The Forestry Code of 2002 identifies the state as the owner of forest land (article 7 Forestry Code) and specifies the conditions and rights of access, use and exploitation (tenure), including for Indigenous Pygmy Peoples. Laying out different tenure regimes, the Forestry Code explicitly recognizes customary holdings (article 36) and gives local communities, organized in families or clans (article 1 (17)), dedicated rights of use, exploitation and self-governance (articles 111 and 112).

The limits of anybody's use and exploitation are also defined in the Code, with article 45 explicitly banning non-authorized exploitation and, generally, "overexploitation". Management plans must be in place for any form of forest exploitation (article 71). Whoever intends – within the limits of the concession or right holding, whether it relates to mining, agriculture, urban developments, tourism or other – to deforest any lot of land, needs a "deforestation permit" (permis de déboisement). The Forest Code includes a number of provisions to set incentives for reforestation, among them the authorization to individuals and local communities to harvest the forest products from the reforested zones (article 80).

Other statutes – including the Decree on Urban Planning of 1957, the Mining Code of 2002, the Agricultural Code of 2011, and more recently the Law on Nature Protection of 2014 – define and shape specific land- and/or resource-related titles and practices and have a bearing on the implementation of a number of envisaged REDD+ activities. Section 4.5 presents an overview of key statutes and implementing provisions, as relevant for the program zone. The table is to be read with the caveat that many of the laws and statutes on land and land-use have a long history and often tend to remain in force in parallel, at least formally, with new regimes, which are evolving at an ever-growing pace; the result is a legal body that is not always synchronized and complementary to each other and that includes regulatory overlaps (c.f. the different land registries: cadastre foncier, cadastre minier, cadastre agricole, cadastre forestier), and even contradictions. For the legal practitioner, it is all the more important to focus on process and broad stakeholder representation, in order to ascertain tenure, land use and access rights as well as other holdings over land (see Chapter 5.1 and Annex 7).

Main land holding types in the program zone

The program zone includes both formalized and informal land-holdings and resource rights. On the side of formalized holdings, a range of different concessions are in place for land in the assessment area. Congolese law distinguishes short-term and long-term (emphyteutic) concessions. Short-term concessions include 5-year long small-scale farming concessions (50-500 ha) for extensive livestock farming (agriculture) and small-scale logging concessions for up to 50 ha (forestry); long-term concessions – for leases of 25 years, with the possibility for DRC nationals to transfer to a perpetual lease (see on rights in rem below) – are given out for both forestry activities (mainly industrial logging, but also conservation) as well as agricultural activities (livestock farming, agroforestry, sylviculture, etc.).

Generally, the level of public and legal recognition differ for short-term and long-term concessions. While short-term concessions are usually not inscribed in the public land registry (even though loose demarcation, in particular with respect to farming concessions through the Ministry of Agriculture, may occur) and while they often transcend the sphere of formalized and informal law with customary institutions, notably the clan chief assuming an important role, long-term and perpetual concessions require full documentation in the land registry.

On the side of informal, or customary law, land access rights, and rights of resource usage focus on communities are arranged mostly around clan structures in both local and indigenous communities. The surface area of available forest land, i.e. flood-proof forests outside concessions, represents approximately half of the forests in the province (including the man-made forests of the "rural complex").

Historically, clan members enjoyed unrestricted access to primary forest land as well as its resources, with the clan chiefs assuming the role as supervisor and arbiter who allocates and demarcates land in case of dispute. While the concept persists to this day, it is increasingly contested at numerous levels, including horizontally among clans and clan chiefs; vertically between the government (which reserves the right to make formal allocations, including for the sake of protection) and the clans; in succession from one chief to another; and generally as a consequence of widespread pressure on, and competition for, land (see below). Today, substantial areas of the land not under formal concession is illegally exploited for wood and charcoal production.

LAND TENURE AND CARBON RIGHTS

In the absence of any specific early law project activity in the REDD+ area, determining the nature of the carbon benefit and carbon ownership, a review of the legal system is required to determine to what extent it can accommodate concepts of forest carbon and its ownership by looking at recognition through constitutional provisions; recognition under existing common law or civil law frameworks associated with property rights; recognition under contractual law; and recognition through separate legislative provisions. Depending upon the legal basis for defining and recognizing the carbon benefit arising, ownership of that benefit (or "carbon right") may fall to one of a number of persons, including *inter alia* the government, a landholder, a traditional forest user, or a third party, such as a concession holder.

Carbon rights are not explicitly referenced in the country's legislation,[29] except recently in the context of administrative procedural law laid down in Ministerial Regulation No 4 of 2012 ("Homologation Regulation").[30]

Applying general principles of Congolese law, one needs to distinguish (i) the right to emission reductions as *obligatio*, i.e. the legally binding commitment of the seller to transfer carbon units issued within a dedicated registry for REDD activities and outputs as defined under the ERPA to the buyer, and to refrain indefinitely from creating, selling or transferring any carbon units issued with respect to such activities and outputs; (ii) the legal concept of a right to emission reductions as a right or ius in rem, and (iii)

[29] Mpoyi, A. / Sakata, G. / Longbango, A. / Kabue, G., REDD+ en RDC. Cadre juridique et institutionnel de mise en oeuvre de la REDD+ en RDC, GLOBE International 2013.

[30] Arrêté Ministériel No 004/CAB/MIN/ECN-T/012 du 12 fevrier 2012 fixant la procedure d'homologation des projets REDD+. In a separate context, i.e. the recently adopted Nature Conservation Law (*Loi No 14/003 du 11 fevrier 2014 relative a la conservation de la nature*), a legislative reference to the "potential value of forest carbon stocks" and the need for its consideration by the government under both the national conservation strategy and the national forest program can be found (article 8), but the provision does not state any legal particularities.

arrangements under Congolese public and administrative law (administrative agreements) aimed at conservation measures, in general, and the implementation of REDD activities and the sharing of benefits, in particular.

Right to emission reductions (*obligatio*)

This right has its legal basis in Congolese contract law, namely article 25 and article 280 of the Code civil ("Des contrats et obligations conventionnelles" of 1888). The government – represented for the purpose of the (first) ERPA under the FCPF by the Ministry for the Environment, Nature Conservation and Tourism – assumes this legally valid obligatio upon execution and is bound under the Congolese Code civil or any other private law regime applicable to the ERPA. The government will, for itself, agree with a range of REDD+ stakeholders similar terms to secure that carbon asset generation is centralized in one actor (e.g. the central government) and that the stakeholders concerned will abstain from marketing the REDD+ activities to third parties.

Right to emission reductions (*ius in rem*)

A right *in rem*, in order to be recognized under Congolese law, would need to fulfill the requirements of rights *in rem* ("droits réels") as defined by Congolese Property Law of 1973(article 1 RF), namely:

- Ownership or dominium ("propriété");
- Permanent concession ("concession perpetuelle");
- Long-term lease ("droit d'emphytéose");
- Heritable building right ("droit de superficie");
- Usufruct ("usufruit");
- Servitude ("droit d'usage et d'habitation" and "servitude foncière"));
- Pledge ("gage");
- Privilege ("privilège");
- Mortgage ("hypothèque"); and
- Forestry concessions (defined as 'right *in rem sui generis'*).

These rights share as common feature that they represent an inherent claim to a particular object (whether movable or immovable) and that they give an absolute or restricted right of use. From the point of view of Congolese law, emission reductions are not considered an object – they lack the physical form – not a forest product[31], neither do they designate a particular form of usage. Rather, they represent the result of an effort and an achievement. They may be the result of a concrete set of land and area-related actions (e.g. reforestation of a particular stretch of land) or they may be created through activities further removed from particular lots of land such as the introduction of certain policy measures with an impact on country- or jurisdiction-wide deforestation.

It follows that Congolese law does not recognize a right to emission reductions as a *ius in rem*. It should be noted, however, that emission reductions need to be distinguished from emission reduction units issued into a registry, as recognized by the Homologation Regulation. While case law is yet missing, it is expected that Congolese courts will take a similar approach as the one taken by US and European courts, namely to recognize property rights to allowances or emission reduction units issued into a registry.

While Congolese law does not grant the right to emission reductions the status as a right *in rem*, it does not mean that holders of land titles and rights of use were defenseless against the government or a third

[31] For a definition see art. 1 (2) Forestry Code: All listed products are tangible objects.

party restricting the scope of their title. This includes the right of e.g. concession holders (and/or of a deforestation permit under article 53 Forestry Code) to perform logging in accordance with the terms of the concession or permit, or the right of indigenous communities to use the forest environment as recognized by Congolese formalized and non-formalized law.

Also, Congolese law recognizes the principles of unjust enrichment and similar institutes (such as "gestion d'affaires"). Under the principle of unjust enrichment an individual, a group of individuals or any entity capable of holding rights, which has created, and asset or a work of any kind, has the right to claim compensation from the person, which has benefited – without legal cause – from such asset or work. This right is a claim for compensation, it is not a claim in rem and it does not imply the creation of an encumbrance of whatever sort.

In a constructive approach, the Congolese state will not wait for stakeholders to raise claims for compensation or rely on the prospect that many of them may ultimately not enforce their rights. Rather, as part of the REDD+ Program the government will procure engagement (implementation) contracts with all stakeholders concerned. The contracts will set out the terms of participation and engagement, will authorize the government on their behalf to negotiate with the Carbon Fund, and will identify quotas in revenues as due benefits for the stakeholders concerned (see for more details Chapters 16 and 18). All contracts concerned will be fully enforceable in the national courts as well as through the grievance and redress mechanism to-be-established under the REDD+ Program. Both existing contract parties can raise claims and those stakeholders, which have not been offered a contract or which have not reached contract execution, for whatever reason.

Administrative conservation permits and agreements (public law)

Of fairly recent origin, with its Homologation Regulation[32]Congolese law today recognizes the right for any or legal person established in the Democratic Republic of the Congo to engage in REDD+ activities as a 'project proponent' ("porteur du projet"). The Regulation describes the process for project proponents to be – any legal persons are prima facie eligible, i.e. land tenure holders or others, whether public or private – to inscribe their activities in the national REDD+ program, to have it validated against an "international" standard, as approved by the DRC government (see annex V of the Regulation), and to receive direct access to so called Emission Reduction Credits (ERCs) issued in a registry and nested within the national scheme for back-to-back commercialization.

For the recognition of project proponents, the Homologation Regulation, which is currently under revision (on this see Chapter 18), requires the conclusion of partnership contracts ("contrats de partenariat") between the government (represented by the Ministry of Environment), which importantly – together with the mandatory adoption of an accord between the project proponent and local communities and Indigenous Pygmy Peoplesis deemed a pre-condition for the right of the project proponent to commercialize REDD+ carbon credits. It is noted that the Regulation distinguishes "emission reductions" and "carbon credits", the latter implying a validation process under an international standard. It is also noted that the Regulation is confined to procedural matters; it does not create particular 'carbon rights', and it does not provide a legal basis for implementation. At the stage, for the Accounting Area applications to receive project proponent status have not been received, and applications are not expected for the immediate future. If a project proponent is approved, this will have an impact on the capacity and authority of the state – as represented by MECNDD – to transfer ERs and ERCs, and will require to be addressed as part of the contractual arrangements between MECNDD and the project-proponent-to-be ("contrats de partenariat"). All the emission reductions reserved for the project proponents will, in this

[32] Arrêté Ministériel No 004/CAB/MIN/ECN-T/012 du 12 fevrier 2012 fixant la procedure d'homologation des projets REDD+.

case, be fully assigned to the state prior to ERPA execution or, as the case may be, as a condition precedent for payments.

Another legal act of relevance, in this context, is Decree 11/27 of 20 May 2011[33] on the issuance of forest conservation concessions. The Ministry of Environment gives out Forest conservation concessions; they confer on the concession holder the "right to utilize the forest for the *valorization* of environmental services, at the exclusion of all extractive activities" (article 3, italics added). "Environmental services" are defined as "the sum of activities giving rise to goods or services that serve to measure, avoid, limit, reduce to a minimum, or correct any encroachment on the environment" (*ibid*.). Whether REDD+ and the participation in REDD+ activities are covered by Decree 11/27 has not yet been finally established, and no case law is available. Following a conservative approach, the REDD+ program will assume that forest conservation concessions do include the right to engage in REDD+ and confer an exclusive right to valorize emission reductions and receive REDD+ credits for the area under concession. The matter will be adequately addressed through contract between MECNDD and the concession holder (see below Section 18).

LEGAL APPROACHES TO REDD+ IMPLEMENTATION

The general approach of REDD+ implementation in the assessment area and elsewhere will be based on voluntary participation of stakeholders, rather than on command-and-control-driven measures. That said, the enforcement of existing rules of protection and limitation of use would be part of the country's REDD+ policy (and a key contribution of government entities). This includes strict application of the perpetual protection status. Illegally deforested land must not be legalized ex-post through the granting of formalized titles. In its role as sovereign owner of the land and the resources, the government will also provide for long-term planning, and it will work towards a more restrictive and sustainable use of future logging and other exploitative concessions.

Beyond enforcement and long-term planning, the relevant legal instrument of implementation will consist in bilateral and multilateral contracts between the government, a REDD+ program holder (such as the province of Mai-Ndombe) or a project holder, on the one hand, and the various stakeholders – concession holders, local communities, Indigenous Pygmy Peoples, village association, not-for-profit organizations, etc. – on the other hand. The contracts will specify options for participation, targets, activities and follow-up, valorization priorities, if any (see before, sub-chapter above), as well as rules for benefit-sharing. The contracts will also include an exclusivity and no-compete clause concerning the REDD+ activities and their exclusive eligibility under the national REDD+ program (or the REDD+ project in question); this clause will strictly adhere to the rules on "double-counting", which are an integral part of the national REDD+ program, in general, and the contractual obligations under any ERPA, in particular.

The table below lists the main tenure/usage types (with relevant stakeholders), the plans/instruments envisaged for them as part of REDD+ implementation and relative to rights on Emission Reduction.

[33] Accessible at http://www.leganet.cd/Legislation/Droit%20economique/Code%20Forestier/D.011.27.50.05.2011.htm.

Table 8: Type of land tenure, users and relevant legal instruments to engage stakeholders

Zone type		Area Mha	Users	Relevant tenure regime	Legal instruments envisaged to engage actors (see	Remarks regarding rights on Emission
Converted logging titles[34]	Production series	1.52	Logging companies	Forestry concessions in permanent production forests (Forestry Code)	Carbon related contracts	Transfer of title
	Protection and conservation	1.15	Logging companies, local population	Forestry concessions in permanent production forests (Forestry Code)	Implementation contracts (proxy-based)	Exclusivity and no-compete clause
	Rural development zone	0.89	Local population	Protected forest (Forestry Code) under customary regime	Implementation contracts (proxy-based)	Exclusivity and no-compete clause
Classified forests		2.04	State (ICCN, implementing agency), Local	Forest within the public domain under various status of protected areas	Implementation contracts (proxy-based)	Exclusivity and no-compete clause
Conservation concession		0.32	Conservation concession holders, Local population	Forestry concessions in permanent production forests (Forestry Code)	Carbon related contracts	Transfer of title
Zones under customary regime	Afforested	4.34	Local population Small-scale loggers	Protected forest (Forestry Code) under customary regime	Implementation contracts (proxy-based)	Exclusivity and no-compete clause
	Non-afforested	2.58	Local population	Customary regime	Implementation contracts (proxy-based)	Exclusivity and no-compete clause
Emphyteutic concessions and farm leases		0.80	Farmers; livestock rearers and neighboring	Land Tenure Code	Implementation contracts (proxy-based) or Carbon-	Exclusivity and no-compete clause or transfer
Mining sites and infrastructure		Less than 0.01	State and mining concession holders	Mining Code, Public domain for infrastructures	No specific instruments	Exclusivity and no-compete clause

CHALLENGES

Challenges are mostly foreseen with respect to the contractual integration of customary landholders. This does not concern so much the contractual negotiation process at both the level of clan chiefs as well as the level of local and indigenous communities as a whole, which are addressed in dedicated stakeholder consultations (see below section 5). Rather it concerns the long-term effectiveness of any contracts concluded.

In the savanna zones, wandering livestock is a recurrent problem, during the dry season in particular when they turn to cultivated or forest land. The absence of the clear delimitation of clan land as concessions and the interpersonal and discretionary nature of the agreements granted by the land chief are potential factors for conflict. These arise in particular when there is a succession (a change of lineage in the chiefdom entails a renegotiation, from "admission" to the amount of the annual charge) or when there is competition for access to resources. This situation requires perpetual awareness and compliance checks of the partnership contracts concluded.

The boundaries of clan land parcels create conflict between chiefs, and the clan right of use (agriculture, fishing, hunting, mining) becomes conflictive when a clan member exercises this right over land in conflict with "clan ownership". On the urban fringes, "newcomers" (migrants) who arrive in excessive or increased

[34] Estimates of the areas of forest concessions on the basis of existing management plans (FRMi, 2015).

numbers, experience discrimination through the clan land practices, or question the admission conditions and charges they are obliged to pay. The response to this situation is to lead integrated contract awareness campaigns with participation of land users at all levels (beyond representatives and clan chiefs), to uphold the law including towards clan members, and to offer migrants paths for future participation.

Conflicts between local communities and concession holders break out in particular when cultivated gallery forests become inaccessible to farmers because they are enclosed within savanna lands held under concession, when land becomes scarce in the clan because of the size of the allocations made by the land chief, or when concession holders lack flexibility in the enforcement of their right to prohibit agriculture inside the concession. The integrated REDD+ approach, which works along a wide number of horizontal agreements, is expected to alleviate this situation.

Access to land tenure in the program zone is most problematic on the urban fringes and in the territory of Yumbi where human density, the scarcity of forests and the widespread grabbing of savanna land by livestock farms create a structural deficit of cultivable land and threaten food security at the same time. This cannot fail to produce periodic conflicts, especially when wandering herds are thrown into the mix. In response, investments in the land (perennial crops, improved fallows, assisted natural regeneration on the savannas) must be adequately secured, including through simple management plans as trialed by the Makala project for the improvement of fallows and the enhanced use of formalization instruments such as registration certificates.

Substantial improvements for **removing de-facto discriminations of local communities, in general, and Indigenous Pygmy Peoples, in particular**, may be triggered by the introduction of a new right to apply for community forest concessions. Decree 14/018 of 2 August 2014, in principle, had provided for a framework to allocate forest land to local communities and ring-fence such allocation with 'local community concessions'. However, in practice, the allocation of community forest land and the issuance of specific concessions proved ineffective. The need for a particular form of organization alien to many local communities quickly became a bottleneck for both application and implementation. Furthermore, the situation for local communities was aggravated by the fact that the Entités Territoriales Décentralisées (ETD), created as part of the Constitution 2006 and set up through Law No 8/16 of 7 October 2008 (Loi organique) do not recognize communities, clans, lineage or families as having legal personalities or particular procedural rights; the concession process is therefore lengthy and often stalled. For the same reason, mandatory participation rights of local communities, e.g. when land is given away to third parties, do not exist; likewise, specific, easily accessible legal rights to challenge decisions do not exist. Ministerial Regulation on the Management and Exploitation of Community Forest Concessions of 2016 provides a governance structure for community concession holders and recognizes customary roles (such as the role as chief). It is expected that the legal act will strengthen the procedural standing of local communities including Indigenous Pygmy Peoples and will ultimately substantially enhance their material rights.

In this context it should lastly be noted that the regulation clarifies that the extent of pre-existing customary rights is not affected.[35] For the purpose of rights to emission reductions and emission reduction credits (ERCs), local communities in the Assessment Area – whether in possession of a formal community forest concession or not – are deemed REDD+ implementation partners and are key recipients of REDD+ revenues. The terms of the concrete engagement and the nature and quota of revenue shares will be laid out in the REDD+ implementation contracts (see Chapter 16).

[35] On this matter Lescuyer/Boutinot/Tsanga/Cerutti, Study of the community forestry regime in the DRC 2015.

4.5 ANALYSIS OF THE LAWS, STATUTES AND OTHER REGULATORY FRAMEWORKS

For a specific analysis of private and public law implications for the program zone, see above Section 4.4. Below (Table 9), we summarize the main laws of relevance for the land tenure regime.

Table 9*:* Laws of relevance for the land tenure regime

Statutory Base Regime	**Relevant Implementing Acts**	**Land Tenure Relevance**	**Relevance for the Program area**
1959 Urban Planning Code		The decree lays down the procedure for preparing local management plans	More stringent implementation will allow for more stable long-term plans for the use of local natural resources
1973 General Property Law / Land Tenure Code (Law No. 73-021) *Loi n° 73-021 du 20 juillet 1973 portant régime général des biens, régime foncier et immobilier et régime des sûretés, telle que modifiée et complétée par la loi n° 80-008 du 18 juillet 1980*	Ordinance 086 (April 10, 1986) modifying Ordinance 74-148 (July 2, 1974) implementing Law 73-021	Defines the concept of ownership – and other rights in rem such as concessions – over movable and immovable objects; Recognizes customary titles and defines the concept of "domanial land" (Article 387)	The Program Zone holds wide cattle ranching concessions. Most of the remaining land is not under formal concession. The Agriculture Dept. recognizes some customary "titles" for small extensive ranching only. Lands dedicated to large-scale (industrial) reforestation projects for charcoal production (ES2), or production of lumber (FS4), are secured under concessions titles for 25 years.
1977 Expropriation Law (Law No. 77-001)		The state can expropriate land under concession and held by local communities, as it deems necessary for public use or in the public interest, subject to payment of compensation.	No expropriation is envisaged.
2002 Mining Code *Loi n°007/2002 du 11 juillet 2002 portant code minier*		Under the Mining Code, rights to mineral deposits are separate and distinct from rights to land, and holders of surface rights Cannot claim ownership of mineral deposits. Defines a range of concession types (exploration and production) for quarry and minerals."	Only one concession title is identified in the Moabi Platform (source flexicadastre) in the ERPD Program Zone
2002 Forestry Code *Loi n°011/2002 du 29 août 2002 portant Code Forestier*	Ministerial order 024 (August 7, 2008) regulates transferability of forestry concessions Decree 08/09 (April 8, 2008) modified by Decree 011/25 (May 20, 2011) sets non competitive allocation process for selling ES, ecotourism, conservation and bioprospection Decree 011/27 (May 20, 2011) entitles to sell environmental services Decree 14/018 (August 2, 2014) related to allocation of	The Code recognized (a) classified forests (public domain), (2) permanent production forests (under long-term concessions), (3) protected forest (less restriction. It defines a range of concession types and other legal forms of usage, namely forestry concessions for a wide range of activities (including logging and conservation), community concessions, and artisanal logging permits and commercial firewood licence. It also recognises customary land holdings (individual or collective property of trees around and within villages et and fields) and as well as use rights. A recent ministerial regulation adopted under the authority of the Forestry Code offers local	The Assessment Area holds 17 forestry concessions, among which one is dedicated to conservation, the others are dedicated to industrial logging (all concessions already signed benefit sharing agreements with communities). A number of new conservation concessions will be created by conversion of existing logging concessions (FS3) and some logging concessions will generate

	community concessions (up to 50.000 ha of ""local community forests"") Ministerial order 024 (August 7, 2008) laying down examination procedure of claims preceding granting or adjudication of forest concessions Ministerial order 028 (August 11, 2008) laying down templates for both contracts and specifications regarding logging concessions Ministerial order 023 (January 7, 2010) laying down template of the agreement to be annexed to the logging concession contract Ministerial order 035 (October 5, 2006) regulating felling and harvesting permits with templates annexed to the Ministerial order 105 (June 17, 2009). The Ministerial order 050 (September 23, 2015) allows creation of a 500 ha artisanal concession title under supervision of local bodies Ministerial order 026 (August 7, 2008) regulating forest reconstitution activities Decree 09/24 (May 21, 2009) creating a National Forestry Fund to support public-financed reforestation activities (including 10% of public revenues from environmental services sells as REDD credits) Ministerial Regulation No 25/CAB/MIN/ECN-DD/CJ/00/RBM/2016 of 9 February 2016 on the management and exploitation of forest concessions of local communities	communities the option (not the obligation) to receive a formalized concession. Allocation of concession and artisanal logging permits are supposed to be based on the formal agreement of communities (including benefit sharing schemes). The Code also sets incentives for reforestation activities such as the property of natural or planted forest for land concession holders and beyond the property of benefits of forest products for anyone planting trees.	ERC through RIL (FS1). An undefined number of artisanal logging permits have been delivered. Most of the remaining forestland is not under formal concession and exploited largely illegally for wood of charcoal production. The program will support the creation of community concessions for the development of small-scale logging under community control.
2011 Agricultural Code *Loi n°11/022 du 24 décembre 2011 portant principes fondamentaux relatifs à l'agriculture*	No implementing acts yet	It provides an agricultural provincial consultative body to be implanted at ETD level, in charge of land dispute settlement; identification of agricultural lands; creation of a land register responsible for proposing land to be conceded and monitor that development standards are met; recognition of local individual of or collective use rights but not title securing them; articles 16 and 82 impose that foreign investor cannot hold more that 50% shares.	Application text will set the procedure of identification of lands suitable for agricultural expansion (governor's competence) et land dispute resolution.
2012 Environment Code *Loi n°11/009 du 09 juillet 2011 portant principes fondamentaux relatifs à la*		Formulates the obligation for all government levels -- central, provincial and decentralized territorial entities -- as well all natural and legal persons to protect the environment. Installs participation rights for everyone as well as access to information rights. Enshrines	The Environment Fund may be used in the future as financial facility for the management of payments and investments.

protection de l'environnement		principles of precaution, transparency, and impact assessment. Creates an Environment Fund for conservation and research purposes. The Fund has responsibility for, among others, the remuneration of "environmental services	
2014 Conservation Code *Loi n°14/003 du 11 février 2014 relative à la conservation de la nature*		It provides obligation of impact assessment studies, consultation of communities and indemnities in case of resettlement. State, province or local bodies (ETD) may concede a protected area for 25 years	Not yet applied to the program zone.
Homologation Regulation of 2012 *Arrêté Ministériel No 004/CAB/MIN/ECN-T/012 du 12 février 2012 fixant la procédure d'homologation des projets REDD+*	(Regulation is under revision)	Regulation describes the process for project proponents to-be – any legal persons eligible– to inscribe their activities in the national REDD+ program, to have it validated against an "international" standard, as approved by the DRC government (see Annex V of the Regulation), and to receive direct access to so called Emission Reduction Credits (ERCs) issued in a registry and nested within the national scheme for back-to-back commercialization.	Whether the Homologation Regulation will be used to recognize direct ERC holdings in the Accounting Area is not yet decided.

4.6 ANTICIPATED LIFETIME OF THE ER PROGRAM

The program will start implementation in 2016 thanks to the different up-front funding (see Section 6.2). The program will be implemented with a long-term perspective of 20 years and with a cost-effectiveness objective (carbon and other revenues). This extends beyond the ERPA with the FCPF Carbon Fund, which is proposed to cover the 2017-2022 period. The financial calculation, showed in Annex 1, has been designed for 10 years. The following chart describes a tentative schedule identifying monitoring steps, ERPA payments and the funding strategy over time.

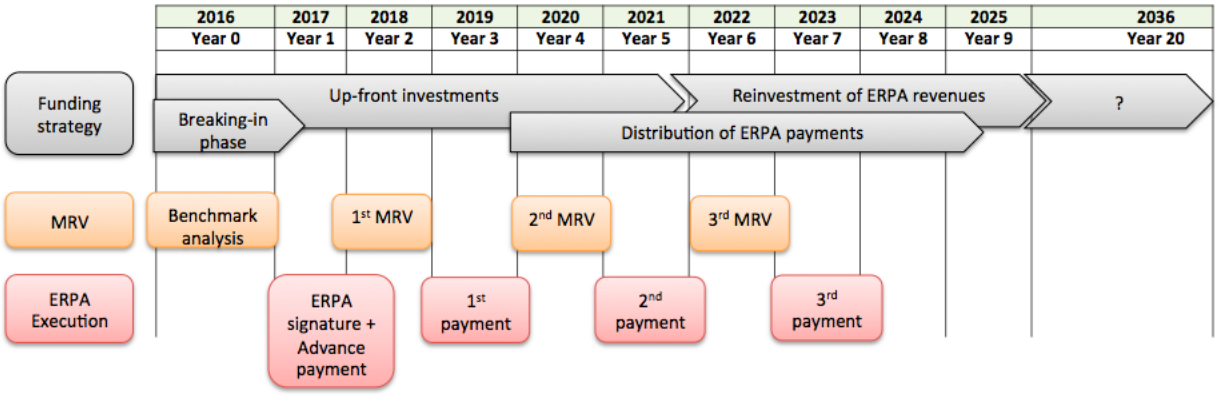


Figure 3: ER Program tentative schedule

5. STAKEHOLDER CONSULTATION AND PARTICIPATION

5.1 DESCRIPTION OF THE STAKEHOLDER CONSULTATION PROCESS

INFORMATION AND CONSULTATION DURING THE DESIGN PHASE

Consultation and information in the design phase of the Mai Ndombe ER Program has taken place at multiple levels. There has been very active consultation with the various stakeholders based in Kinshasa in the context of the REDD+ readiness phase, which has mobilized a large number of organizations on a variety of themes through numerous working groups. Furthermore, significant efforts have been made since the submission of the ER-PIN to inform and consult with local stakeholders in Mai Ndombe (Indigenous Pygmy Peoples, local communities, civil society and local administration) through meetings in every territory and training workshops in the capital of the former and new province (Bandundu Ville and Inongo).Annex 8summarizes the various consultations and workshops held in the province and in Kinshasa in connection with the ER Program.

The design phase was based on various levels and frameworks of participation and consultation:

a. **The Technical Secretariat,** which includes the main program partners, met regularly in order to coordinate and discuss progress of activities. It was formed already in the development phase of the ER-PIN based on a Memorandum of Understanding and is composed of: **CN-REDD/MEDD,** the **provincial government of Mai-Ndombe, civil society** (through the GTCR), the **WWF-DRC** and **WWC/ERA**;

b. The various stakeholders participating in ER Program design were organized into **five working groups:** (i) Communication, (ii) Benefit sharing, (iii) Intervention strategy, (iv) Safeguards and (v) reference level/MRV. The working groups provided input to the program design and coordinated the actions of the various partners. They have been meeting on a number of occasions since September 2014 (at least three times each).

c. In order to ensure the close involvement of local communities and Indigenous Pygmy Peoples, **representatives from the 19 sectors in 8 territories of the Province were appointed** with the facilitation of local civil society organizations coordinated by the NGO OCEAN. The 38 representatives include 30 from local communities and 8 from Indigenous Peoples communities, three of which are women. The representatives' designation was guided by the following criteria: (i) residing in the village (ii) engaged in development actions in the area, (iii) moral integrity, (iv) capacity to provide input for the ER Program and feedback to their community. These representatives were elected during meetings with representatives from surrounding villages that took place in each territory. A Procès-verbal meeting report was established after the vote and

signed by the Territory Administrator. A series of at least four workshops and missions took place to consult with these representatives and take their views into consideration in the program design.

d. **An extended cooperation convention** was signed by most of the partners represented in the working groups, the designated representatives of the local communities and Indigenous Pygmy Peoples, the administration as well as the provincial and national civil society. This convention has been shared and updated during more than 6 months in order to include the different inputs of all the stakeholders. The convention has been then presented during a launching workshop in Bandundu and is still open for signing and will serve as the basis for annexes describing the precise terms of reference for collaboration between the program and the various partners.

It is important to highlight the following issues with regard to the information and consultation process during the design of the Mai Ndombe ER Program.

a. The design of the program has built upon studies and programs developed at national level, including the National REDD+ Strategy Framework, the Strategic Environmental and Social Assessment (SESA) and the FIP, which were subject to a wide-ranging and inclusive consultation process (See Self-assessment of the REDD+ Readiness Package in the Democratic Republic of Congo on the FCPF website).

b. The DRC's experience acquired over these years of preparation for REDD+ has demonstrated the significant risks of communication on a massive scale regarding a mechanism that is still in development and with major uncertainties with regard to funding. Many misinterpretations, misunderstandings and frustrations have been reported to the CN-REDD by most of the stakeholders: administrations, private sector, civil society and communities. In the case of the Mai Ndombe ER Program, where uncertainty remains as to its acceptance by the Carbon Fund, it is especially risky to generate too high expectations.

c. Finally, it should be stressed that the involvement of local communities and Indigenous Pygmy Peoples is an integral part of the first steps of program implementation. All the sectoral activities will be initiated through the establishment of local sustainable development plans designed at village level and validated by sector/chiefdoms, territories and subsequently the province. This FPIC process is fully integrated into the project's activities and communities will have full discretion as to whether or not to participate. These steps of consultation will be crucial to the success of the program and respect the rights of communities and Indigenous Pygmy Peoples.

Further consultations on the design of the ER Program have been taking place on the basis of this document. The table below summarizes the main stages up to the validation of the final ERPD, which will be submitted to the Carbon Fund around April 2016.

Table 10*:* Consultation and validation stages of the ERPD

Stages	Target groups	Dates	Objectives/comments
Sharing of the draft ERPD document by email	Secretariat and other key stakeholders (central and provincial administration, national and international NGOs, private sector)	July – September 2015	Comments on the draft ERPD open from July to September in order to enrich the final version
Organization of targeted	Representatives of the communities, Indigenous Pygmy Peoples, local NGOs and other provincial stakeholders	September – October2015	Disseminate and present the strategy, implementation arrangements, the benefit-sharing principles, operation of feedback and grievance redress

consultations in the province			mechanism, in order to compile comments for the final version
Organization of targeted consultations in Kinshasa	Administrations, civil society and private sector	September – October 2015	Organize thematic meetings to explain the options adopted in the draft ERPD, and enrich the final version
Validation workshops in Inongo and Kinshasa	All stakeholders	April 2016	Validate remaining issues following the TAP assessment and final validation of the document before submission to the Carbon Fund

INFORMATION AND CONSULTATION DURING THE IMPLEMENTATION PHASE

The program will dedicate resources at the disposal of the program management unit and the local executing agencies in order to ensure the dissemination of information to stakeholders as well as their regular consultation. The methodology for the deployment of the program activities is based on consultations at terroir level as part of the participatory development of the land-use map and associated sustainable development plans. The box below provide an overview of the Free, Prior and Informed Consent process that will be conducted at the terroir level. In parallel, a major communication campaign will be launched upon the initiation of the activities (scheduled for 2016). In particular, the program will rely on community radio and liaison workers that have already been identified and trained during the design phase.

Over the lifetime of the program, regular consultations will be carried out at decentralized territorial entity level and territory level in order to adjust the program activities and the investments of collective interest. The population will also have the opportunity to submit feedback or complaints as described in Section 14.

Box 1: Application of the Free, Prior and Informed Consent (FPIC) during the implementation phase

Free, Prior and Informed Consent will be implemented at each level prior to implementation steps of the ER-Program strategy. Communities and indigenous people, administrative and political bodies, customary chiefs and producers groups will be informed, consulted and will give their consent to participate in and? Implement ER-Program activities.

To materialize FPIC processes at the community level, the program will ensure institutional structuration through representatives on legal and legitimate Local Development Committees (LDC). These committees will engage the communities to participate in the program and will be the key intermediary in the FPIC process. The ER-Program implementation strategy towards communities is composed of the following 5 steps, which will be sanctioned by key documents allowing to transparently monitoring the proper application of FPIC:

1. **Establishment of Local Development Committees** (Operating authorization of LDC) ensuring participation of indigenous peoples in areas where they are present.

2**. Signature of a cooperation agreement** between the government, Local Executing Agencies and communities through LDCs for participation in the ER-Program (Cooperation agreement signed)

3. **Participatory mapping of customary terroir** sanctioned through a document validated by LDC and land chiefs.

4. Development of a **land and natural resources management plan of customary terroir**s sanctioned through the signature of land chief, LDC and approved by the Territory Administrator and land affairs services.

5**. Identification of mitigation measures sanctioned by *Payment for Environmental Services* contracts** with LDCs and professional organizations to implement key program activities (reforestation, forest protection, savannah burning protection and natural regeneration, dissemination of agricultural inputs and methods, support to reduce the impact of artisanal logging).

5.2 SUMMARY OF COMMENTS RECEIVED AND HOW THESE VIEWS HAVE BEEN TAKEN INTO ACCOUNT IN THE DESIGN AND IMPLEMENTATION OF THE ER PROGRAM.

In the course of the year 2015, the CN-REDD received a lot of feedback and comments reflecting the views of stakeholders vis-à-vis the Mai Ndombe ER Program. These comments were compiled in particular during the consultation and communication activities described in the Table 11 below**.** This section will be updated with the coming comments on the final draft ERPD. The Table 11 below summarizes the main comments received and how they have been incorporated into the design of the program, or how they will be incorporated in the coming months and during implementation.

Table 11*:* Summary of the comments received and how these views have been taken into account in the design and implementation of the ER Program

Main subject	Type of stakeholder	Comments - risks expressed	Incorporation
Institutional arrangements	Provincial government	The decentralized services from the State should be given a greater role in the control and monitoring and evaluation functions	➢ The role of the provincial government and the Provincial REDD+ Steering Committee has been strengthened, with real decision-making and control powers ➢ The functions of implementation monitoring and evaluation and of complaints management have been considered at decentralized service and ETD level
	Civil society, government	Risk of conflict of interest for the program management unit (particularly if this is made up of project holders)	➢ The option to hire a third-party firm as program management unit has been decided ➢ The risks are reduced by the requirement that the province, via the Provincial REDD+ Steering Committee, approves the contracts and payments to the various beneficiaries.
Sharing of REDD+ revenues	Civil society (REPALEF)	Indigenous Pygmy Peoples taken into account in revenue sharing	➢ The revenue sharing principles explicitly stipulate a share for indigenous populations because of their historical responsibility in the preservation of forest ecosystems.
	Private sector (WWC)	Honoring of agreements already signed with the government	➢ A negotiation is currently progressing in order to guarantee the long-term continuation of the WWC project while at the same time respecting the methodological framework of the Carbon Fund.
	Civil society, private sector	Need to re-invest in order to maintain the startup funding and to extend the activities to new stakeholders	➢ The share of revenues allocated to the State under existing and future agreements will be redirected to the program activities directly.
	Provincial government	The province must be provided with the resources to fulfill its governmental functions	➢ A share of the revenues will be channeled directly to the province's budget. In particular, this will place responsibility on the province for the performance of the program.
	All stakeholders	There is a high risk of land conflicts between stakeholders regarding distribution of benefits.	➢ The signature of sub-contracts under the REDD+ revenue sharing plan must be based on prior recognition of rights over land and resources (concession contract, natural resources management plan etc.)
Strategy and activities	All stakeholders	It is necessary to address small-scale logging which is a major driver of deforestation and degradation	➢ The program provided support activities for the small-scale wood trade, as well as reinforcing monitoring by the environmental services.
	Central and Provincial Government	Participation of provincial and state services in the program strategy must be encouraged	➢ All program activities enabling the program will involve the relevant state services, in particular the environmental services for enforcement of controls.
	Civil society	The REDD+ activities with forest concession holders must be made conditional upon compliance with the legality of operating practices	➢ A study, funded by EFI and executed by FRM, is working on establishing a compliance standard for forest concessions (see in Annex)
	All Stakeholders	The program area is too large and actions taken are at risk of being too dispersed without any real impact on deforestation.	➢ The program will have a phased approach, starting with a focus on pilot areas in order to determine and distribute the lessons learned ➢ The program will focus on priority areas where the risk of deforestation is high.
Communication	Civil society	People have very little understanding of the program and REDD+ in general (excessive local expectations)	➢ CN-REDD conducted missions and training sessions throughout 2015 to provide information about the program (particularly through the identification and training of community volunteers and radio stations)

	Government, Civil society	There are still disinformation campaigns by local politicians about REDD+ and the program	➢ We will have to present the program at all levels from September, including to local elected officials and leaders.
Safeguards	Civil society	Lack of ownership of the safeguard principles and tools by the population and government services in the province	➢ Extension of safeguards through several targeted training sessions and workshops, making it possible to define in a participatory way the monitoring indicators for relevant safeguards
	Civil society	Lack of capacity of the state to enforce safeguards	➢ In addition to monitoring measures, safeguards by decentralized services and implementing agencies, the program will rely on independent inspections and observations by civil society, collected using the technologies made available by the MOABI (internet platform for collaborative mapping, smart phones, tablets and "open source" apps for tracking REDD+)
	Civil society	Making the safeguards binding by linking them to payments	➢ Respect of safeguards will determine firstly the generation of credits (approval standards). Each subcontract then includes clauses that will link payments to social, environmental, and compliance standards.
Reference level and MRV	Partner	The emission factors calculated by the LiDAR technology are not representative of certain areas	➢ Organization of additional field data collection mission to refine the model by the end of 2015
	Donors, Civil society	Alignment with tools and methodologies used at national level for the calculation of reference levels and MRV	➢ Several coordination meetings organized to harmonize work at national and provincial level ➢ Involvement of DIAF in evaluating the accuracy of the data produced ➢ DIAF involvement planned in the implementation of MRV (consistent with SNSF)

6. OPERATIONAL AND FINANCIAL PLANNING

6.1 INSTITUTIONAL ARRANGEMENTS AND IMPLEMENTATION

The institutional arrangements for the Mai-Ndombe ER program are designed to be in line with the most recent developments of DRC's REDD+ process, namely the ongoing operationalization of the National REDD+ Fund. This includes the establishment of a National REDD+ Fund Steering Committee and a REDD+ Executive Secretariat.

As pointed out in Sections 2.3 and 4.1, the operationalization of the National REDD+ Fund is accelerated because of the recent partnership between CAFI and DRC. The capitalization of the Fund, secured through the Letter of Intent signed in April 2016, will advance significantly the implementation of national sectoral reforms, capacity building and integrated programs at provincial level. These circumstances are considered to increase remarkably the delivery chances of the ER Program and will help to address capacity challenges over time. Please see in Annex 9 the roadmap for the operationalization of the National REDD+ Fund.

The overall strategy of the program regarding the institutional design is to:

- Embed the ER program into the national REDD+ process;
- Coordinate various finance sources and avoid duplication of structures, functions or activities;
- Minimize fiduciary risks by involving external service providers;
- Build capacities of program stakeholders at the same time and develop reliable systems to ensure accountability.

Figure 4 summarize the governance and implementation arrangements as well as financial flows. The subsequent sections provide details on each institution's roles and responsibilities.

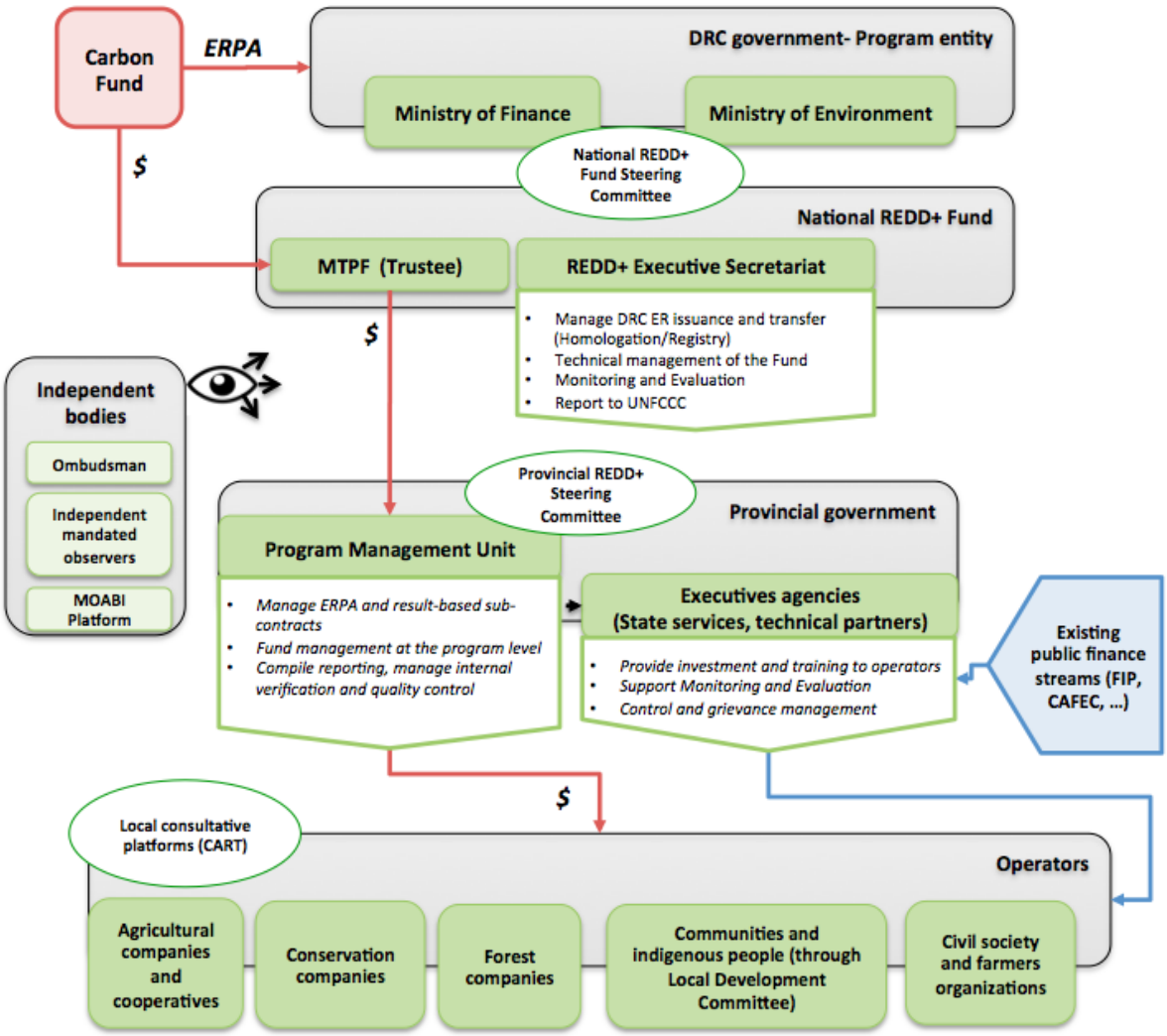


Figure 4: Implementation scheme for the Mai-Ndombe ER Program

NATIONAL SUPERVISION

The Government of DRC will be the signatory of the Emission Reduction Payment Agreement (ERPA). It is the direct contact of the Carbon Fund Administrator and is legally responsible for the program's success. The ERPA will be signed by the MECNDD (see Section 17).

The Ministry of Environment, Nature Conservation and Sustainable Development is the ministry responsible for the REDD+ process and the main contact of the UNFCCC. It will play a national supervisory and regulatory role and will work closely with the Ministry of Finance in the governance framework of the National REDD+ Fund. The ministry will co-chair the National REDD+ Fund Steering Committee and co-

manage the REDD+ Executive Secretariat. The revision of the homologation procedure[36] is ongoing led by the Ministry of Environment and will be aligned to the emerging national REDD+ infrastructure.

This National REDD+ Fund Steering Committee has the function of piloting the National REDD+ investment frameworks and the National REDD+ Fund. It will be a decision-making body chaired by the Ministry of Finance in close collaboration with the Ministry of Environment and composed of the various REDD+ related sectoral ministries. Furthermore, the committee will include representatives from civil society and Indigenous Pygmy Peoples, private sector and technical and financial partners (exact composition and mandate is currently under review). It will give strategic orientation for the implementation of the National REDD+ Investment Plan, validate program proposals and instruct the Multi-Partner Trust Fund (MTPF) to transfer funds to implementing agencies. Other bodies related to the operationalization of the National REDD+ Fund include the REDD+ Executive Secretariat (see below) and the Technical Committee of the National REDD+ Fund chaired by the MECNDD in charge of reviewing program proposals. The National REDD+ Fund Steering Committee will play a defined role at the sub-national level by validating the technical and political directions proposed by the program. In particular, it will ensure the alignment of the program with the National REDD+ Strategy Framework, compliance with safeguards requirements and can intervene, if necessary, in the management of complaints, appeals and decisions.

The REDD+ Executive Secretariat is a body responsible for the technical management of the National REDD+ Fund. It is in charge of preparing technically the decision-making process of the National REDD+ Fund Steering Committee and in particular authorization, monitoring, evaluation and complaints managements of REDD+ projects and investments in the country. The Secretariat will use for these tasks the national REDD+ registry (see Section 19). It will work closely with the Ministry of Environment and the Ministry of Finance but also with others ministries involved in the implementation of the REDD+ Strategy. It will be the main agency responsible for the Emission Reductions Credits generated by the program and the national verification of carbon and safeguards monitoring reports, relying in particular on the various departments of MECNDD, such as DIAF and DDD. It will be responsible in particular for:

a. Registering, preparing approval and homologation of REDD+ projects and programs.[37]
b. Checking the reports for monitoring of emission reductions and monitoring of safeguards and co-benefits submitted by Program Management Unit(s) and project owners in order to certify that credits generated by projects/programs comply with national standards and to provide technical advice to the National REDD+ Fund Steering Committee.
c. Ensuring the proper application of the environmental and social management framework and specific frameworks, as well as proper handling of complaints;
d. Managing information about projects and programs through the National REDD+ Registry, including information related to the generation and certification of emission reductions;

Informing the National REDD+ Fund Steering Committee, the UNFCCC and international partners on national and sub-national progress.

[36] The homologation procedure under the “Homologation Regulation” means the administrative process of: approving REDD+ projects and of transferring rights related to Emission Reductions, see Chapters 4.4 and 18.

[37] Pending the results of the ongoing revisions of the homologation procedure.

PROVINCIAL MANAGEMENT

The provincial government of Mai-Ndombe is the main responsible entity for the program's success. In order to fulfill this role of steering and policy coordination, the provincial government will be supported by a multi-stakeholder Provincial REDD+ Steering Committee (see below). Technical and administrative tasks will be "outsourced" to the Program Management Unit and overseen by the provincial government. The provincial government could sign a delegated authority agreement with MECNDD, which will be the signatory of the ERPA with the Carbon Fund, in order to formalize its engagement in the program delivery.

The Provincial REDD+ Steering Committee will be in charge of the ER-Program management as well as the ER Program-related investment programs in the province (FIP and new integrated program to be financed by CAFI). It will be chaired by the Governor and include representatives of the provincial government departments involved in the program (including agriculture, forestry, energy, health, land use, land rights), the territorial administration, decentralized services, the provincial REDD+ focal point the different Executive Agencies of the program, the private project developers, civil society, local communities and Indigenous Pygmy Peoples. Terms of Reference for the Committee are currently being prepared and include**:**

a. Coordinating the overall implementation of the program;
b. Providing policy and strategic direction to the program;
c. Approving subcontracts for implementation of the program with intermediaries and beneficiaries;
d. Approve work plans and program budgets;
e. Validate monitoring reports for emissions reductions, safeguards and co-benefits.

The Program Management Unit will be responsible for the daily management of the program and will be based partly in the capital of the province of Mai-Ndombe (Inongo). It will be the executing agency of the program and sign a service provider agreement with the government through the National REDD+ Fund institutional structure. In order to minimize fiduciary risks and bridge capacity gaps, in particular in the short term, the management unit will be a firm or consortium with a credible track record and recognized skills in order to tackle the challenge of this innovative program.

It will act under the control of the provincial government and the Provincial REDD+ Steering Committee. This committee will validate the Program Management Unit's plans and budget at least once a year.

The strategy is that the Program Management Unit will build capacities at provincial level over time, so that the functions fulfilled by this unit can be fully integrated into the provincial government in the medium term. It will work in close contact with local implementing agencies and project owners in the province. The main functions of the Program Management Unit include:

a. **Administrative and financial management**: managing the interface with the Carbon Fund and the contracts and result-based payments with sub-projects and implementing partners according to the benefit sharing plan. This includes implementation of activities supported by the advance payment from the Carbon Fund.
b. **Strategic and technical coordination**: proposing strategic reinvestment plans, coordinating the technical partners, involving the administration and the governorate.
c. **Carbon and non-carbon reporting**: compiling monitoring data with the support of the implementing agencies, by performing quality control and producing carbon and safeguards monitoring reports.
d. **Marketing of the program.** Dialogue and engagement of buyers of Emission Reductions and investors.

The terms of reference of the Program Management Unit are proposed in the Annex 9. They will be consulted in the coming months with stakeholders in Mai-Ndombe in order to be endorsed by the provincial assembly and/or the Provincial REDD+ Steering Committee.

IMPLEMENTATION

The implementation of the program on the ground involves multiple stakeholders operating at different levels depending on their abilities, their mandates, and their rights. It will involve the following categories of actors:

Operators	The program provides a strategic and procedural framework in which different stakeholders can register their actions in order to benefit from monetary or non-monetary benefits of the program. These stakeholders may be: • Private companies that have concession titles or other farm leases (forestry or conservation concessions, agricultural or farming concessions, reforestation company...). • Organizations or cooperatives of producers (fishermen, ranchers, farmers...) • Small scale Forestry Companies • Local communities and Indigenous Pygmy Peoples through their local Development Committees • Decentralized technical services (agriculture, forestry, fisheries, etc.) • NGOs and Local Associations These various players may be involved in the program through several types of partnerships or contracts (see Section 15.1 for details of contracts). Depending on the types of contracts, project leaders and activities will therefore have responsibility for: a. Implementing the actions specified in the contracts or partnerships while respecting social and environmental safeguards. b. Prepare and submit monitoring reports to the Program management unit, which include monitoring carbon or proxy performance and monitoring of compliance with environmental and social safeguards.
Local Executing Agencies (LEA)	**Local Executing Agencies** are key intermediaries in the implementation of program activities. They act as project managers delegated by government and are contracted by the Program management unit or the FIP Coordination Unit. (WWF has already been selected to be LEA in Plateau District). They will work closely with Decentralized State Services. They are responsible for: c. Establishing contracts with operators/beneficiaries (local communities, farmer's organizations and civil society, small farmers and entrepreneurs), but also with NGOs providing support for specialized services support (demarcation of territories, co-management of fisheries…). d. Directly implementing certain activities (investment, supply of equipment, etc.) e. Strengthening the capacity of stakeholders in monitoring and evaluation; f. Compiling monitoring and evaluation reports on sub-projects for which it is responsible; g. Supporting local governments and communities in the development of natural resource management plans and prioritization of investments;

	h. Facilitating payments in kind or expected payments arising from payment contracts for proxy results; i. Fulfilling the social and environmental screening grids for sub projects for which it is responsible;
Decentralized State Services	Decentralized State services will be involved in the implementation of the program. They will be strongly reinforced in term of training and material support to ensure their active participation in the program. This different Services (interior, environment, agriculture, tenure) will be involved in (i) the vulgarization of agricultural/forest practices, (ii) the validation of the Sustainable Management Plan and activities boundaries of villages or operators, (iii) the verification of protected or reforested area. The environment services will be especially reinforced in order to strengthen forest and wildlife law control (through checkpoints and field-visits).
Other executing agencies	Some other organization will also be responsible for certain enabling components of the program. The Annex 11lists the different execution agencies envisaged for in the program.
Territorial consultative platforms (CART)	**This consultative platforms at territorial, sector and chiefdoms levels** are defined and recognized by the Congolese government through his Ministry of Rural development as entity in charge of coordinating rural and agricultural development at the local level. The program will broaden this existing mandate in order to give them a role in the overall management of natural resources. This platform will also be in charge of monitoring the implementation of activities and in particular to control the execution of collective investments as defined in the SDPs. This platform will also be at the forefront of conflict resolution in relation with natural resources management and REDD+ implementation. This consultative platform will be composed of representatives of territorial administration, local State services of key sectors involved in the program (agriculture, environment, tenure, security, …), chiefs of sector, and chiefdoms, representatives of customary land chiefs, representatives of LDCs and Indigenous Pygmy Peoples, representatives of civil society and private sector involved in the area. As Indigenous People may not be adequately represented in those institutional frameworks, the ERPD can rely on the DGM governance bodies described above (section 4.1) to ensure their effective participation The program planned and budgeted the total reform of this platform in order to ensure representativeness of all stakeholders and also to provide them material and financial means for their functioning (Enabling pillar of the program).

MONITORING AND EVALUATION ARRANGEMENTS

The monitoring and evaluation of the program will be structured mainly around the production of two types of progress reports: (i) The monitoring report on the emission reductions that will trigger payments by the Carbon Fund and other emission reduction purchasers, but also being the basis for the performance-based payments as defined in the contracts with the operators (see Section 9); and (ii) The monitoring report on the safeguards and non-carbon benefits that will compile information on the impact studies and compliance with safeguard measures when necessary. This report will follow the progress of the program compared to the national social and environmental standards (see Section 14).

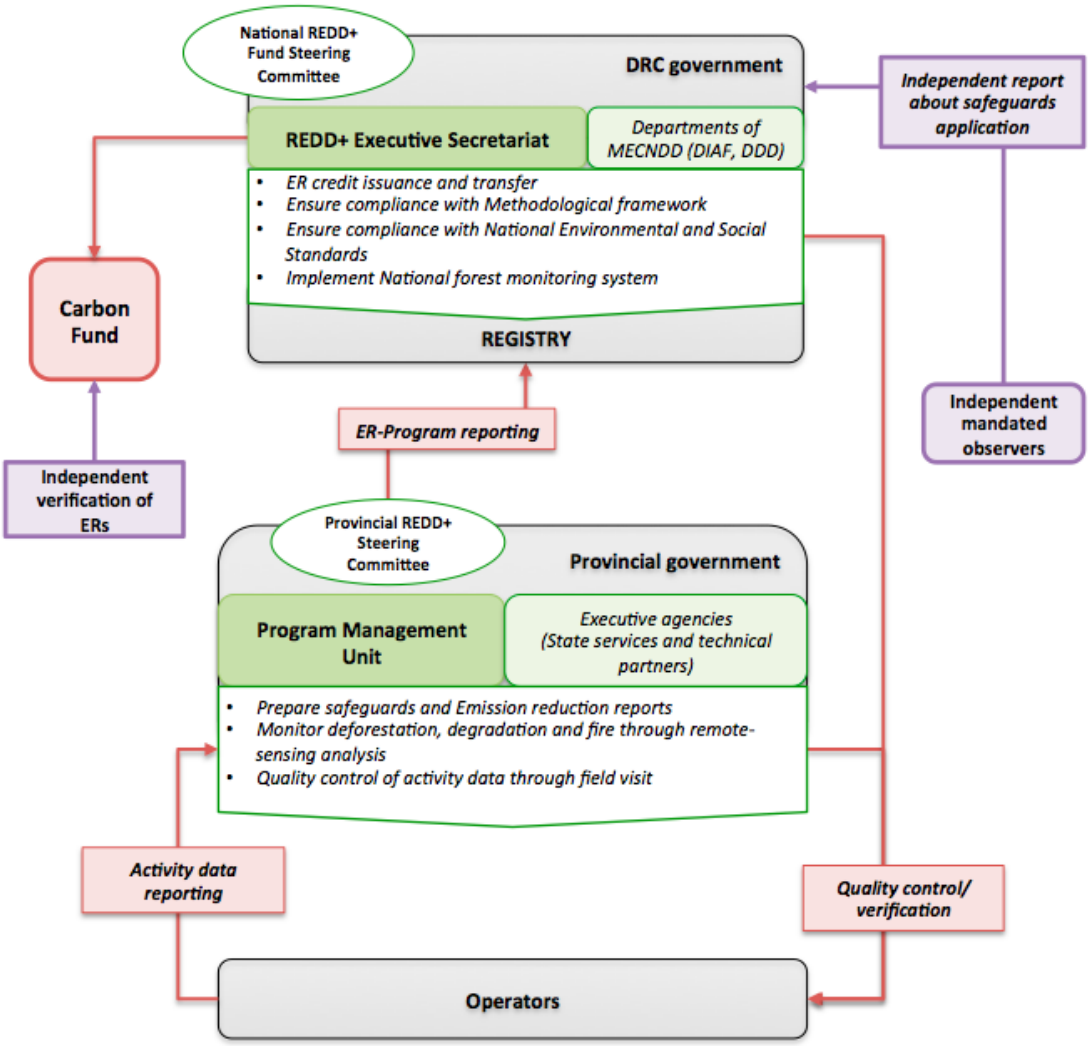


Figure 5: Role and responsibilities for monitoring and reporting of carbon and non-carbon performance

The responsibilities of the various entities within the monitoring and evaluation functions are included in the Annex 12. These will need to be refined but this Annex provides an overview on key functions for monitoring and evaluation. The monitoring and evaluation will involve the following organizations:

DIAF	**The Directorate of Inventory and Forest Management (DIAF**) is responsible for the National System for Monitoring of Forestry through the IT platform Terra Congo. Several of its officers will be seconded to the Program management unit to support the achievement of provincial analyzes (see Section 9)
Territorial consultative platforms (CART)	**This consultative platforms at territorial, sector and chiefdoms levels** are defined and recognized by the Congolese government through his Ministry of Rural development as entity in charge of coordinating rural and agricultural development at the local level. The program will broaden this existing mandate in order to give them a role in the overall management of natural resources. This platform will then be in charge of monitoring the implementation of activities and in particular to control the execution of collective

	investments as defined in the SDPs. This platform will also be at the forefront of conflict resolution in relation with natural resources management and REDD+ implementation. This consultative platform will be composed of representatives of territorial administration, local State services of key sectors involved in the program (agriculture, environment, tenure, security, …), chiefs of sector and chiefdoms, representatives of customary land chiefs, representatives of LDCs and Indigenous Pygmy Peoples, representatives of civil society and private sector involved in the area. As Indigenous People may not be adequately represented in those institutional frameworks, the ERPD can rely on the DGM governance bodies described above (Section 4.1) to ensure their effective participation The program planned and budgeted the total reform of this platform in order to ensure representativeness of all stakeholders and also to provide them material and financial means for their functioning (Enabling pillar of the program).
Independent mandated observers (IMO)	The independent mandated observers (IMO) at provincial and national scale will aim (i) to observe law enforcement and illegal practices in the forest sector; (ii) to verify the implementation of safeguards plan by REDD+ project promoters and Local Executing Agencies, (ii) to study the management of complaint mechanisms by decentralized state services and the CARTs, (iii) to compile the information provided by local OSCs for players in deforestation and forest degradation; (iv) prepare thematic reports on each of these three topics (safeguards, deforestation, complaints process) and, if appropriate, make recommendations to strengthen the capacity of decentralized state services. Currently, the national NGO OGF (Forest Governance Observatory) is working on a methodology for independent monitoring for REDD+ based on its experience as an independent observer of the FLEG process. To track compliance with SSE and the forestry act, as well as with its implementing measures in an independent manner, OGF will use the combined OIFLEG-OIREDD methodology developed thanks to the Open-Mai Ndombe project with the participation of local communities.
MOABI	**The aim of Moabi** is to strengthen governance and transparency in the REDD+ process. To achieve this goal, Moabi has designed an independent platform for collaborative mapping. This aims to share and enhance the spatial data relating to REDD+ in RDC, such as (i) information on the drivers and players in deforestation and forest degradation, or (ii) independent monitoring of the implementation of REDD+. This tool is particularly appropriate for ensuring transparency in the REDD process that will allow civil society to publicly release the realities of the territory. In addition, this platform can also be used by REDD+ independent observers appointed by the central government or the provincial government.
Independent Auditors and Verifiers	The monitoring reports issued by the Program management unit and forwarded to the Carbon Fund Administrator through the program entity will be subject to audit as stated in the general terms and conditions of the ERPA. Auditors appointed by the Administrator of the Carbon Fund may conduct this audit. However, given that the program also plans on a validation by the VCS JNR standard (Verified Carbon Standard, Jurisdictional and Nested Approach), we can expect the audits in the VCS framework may also be recognized by the Administrator of the Carbon Fund.

FINANCIAL ARRANGEMENTS

Two main types of financial flows will be coordinated under the program: 1- the various up-front finance programs whether public (FIP, CAFI, CAFEC) or private (investment fund, entrepreneurs). The other are Carbon Fund payments at the time of emission reduction credit verification (See Figure above).

The various up-front investments will be channeled directly to the executing agencies and operators, particularly in the context of existing contracts (WWF project manager of the CAFEC and PIREDD FIP Plateau project) but also for future contracts (e.g. under CAFI).

The Carbon Fund payments will be transferred directly to the National REDD+ Fund through the MTPF**.** This Fund is intended to channel result-based payments from buyers as well any investment-type of finance to support enabling and sectoral programs of the REDD+ National Investment Plan of DRC. The idea is that the Fund will then allocate the defined share of the ERPA payments to the Program Management Unit for execution of the Benefit-sharing plan. The share of the ERPA dedicated for reinvestments (see section 15) will remain in the National REDD+ Fund and be disbursed based on proposals from the Provincial REDD+ Steering Committee for investments in the Mai Ndombe province.

A manual of procedures will be developed for the program before ERPA signature. Main stages of disbursement of funds for performance-based payments and investments can already be outlined as follows:

1. **The program results are measured** by the various entities responsible for the monitoring and evaluation of the carbon performance (DIAF, project developers).
2. **The Emission Reduction Credits (ERC) monitoring report** is compiled by the Program Management Unit, approved by the provincial government through its Provincial REDD+ Steering Committee and then uploaded to the registry for verification and validation by national entities. This report outlines the performance of stakeholders integrated into the PES program (proxy or carbon) and associated payment orders. (These payment orders could have a threshold that requires validation by the Provincial REDD+ Steering Committee)
3. **The ERC monitoring report is sent** by the DRC Government to the Administrator of the Carbon Fund, which mandates independent verification.
4. **The payments of ERPA emission reduction credits are** transferred to the MTPF (Trustee of the National REDD+ Fund). Based on the monitoring report identifying the payments that need to be distributed to the stakeholders, the MPTF transfers a share of the ERPA payments to the Program Management Unit for execution of the benefit sharing plan.
5. **Result-based payments distribution.** The Program Management Unit distributes, directly or via technical partners, payments to different operators for performance depending on the payment orders of the monitoring report by the ERCs.
6. **Provision**. The remaining funds are kept in the National REDD+ Fund, but assigned to the Mai-Ndombe province, for reinvestment and provision in case of financial risk.
7. **Reinvestment.** Periodically, the Program Management Unit, on behalf of the Provincial REDD+ Steering Committee, makes a proposal for an investment plan with the remaining balance. This plan is proposed to the National REDD+ Fund Steering Committee for execution. The funds are then administered by the Program Management Unit who contracts Local Execution Agencies (LEA) to conduct the enabling or sectoral activities as part of the reinvestment plan.

6.2 ER PROGRAM BUDGET

Financial strategy of the ER Program

The ER-Program is structured to coordinate different sources of up-front (investment-type of) finance, start the implementation of activities quickly and ensure sustainable financing in order to support stakeholders engaged in mitigation activities over time. At the same time, the program is designed to be transformational by putting an emphasis on enabling activities (including policy incentives), such as land-use planning, good governance and family planning, to address the underlying causes of deforestation. Up-front public and private finance will serve as a basis to engage stakeholders in the definition of land-use strategies and to implement mitigation activities that will generate carbon performance. In parallel, the program will continue to mobilize additional financial resources to increase the overall funding volume to achieve the program's ambition. Two important elements of the fundraising strategy include:

i) Establishing partnerships with the private sector incentivized by a co-investment strategy (which is currently being tested in the FIP PIREDD Plateau) or carbon performance-related rewards during the program period;

ii) Continuing the dialogue with international donors to expand on the program's planned set of enabling and sectoral activities, e.g. family planning in the context of the national demography program, provincial land use plans in the context of the national land use reform, measures to improve forest governance (all included in DRC's National REDD+ Investment Plan).

The figure below illustrates the program's overall financing strategy. The carbon performance generated by the first implementation phase of the program (i.e. the ERPA term) will allow DRC to sale ERs to the Carbon Fund and other ER buyers (e.g. Green Climate Fund, voluntary or regulated carbon markets). A main feature of the program's financial strategy over 10 years is to reinvest a substantial share of the carbon revenues in program activities in order to first complement and later on ideally substitute the initial public investment funding. Emission Reduction revenues are thus considered as a way to ensure sustainable financing of activities during a 10-year period and maximize the delivery chances of the ER Program (prevent the risk of financial shortfalls). Both the reinvestments as well as the distribution revenues to program beneficiaries are captured in the benefit sharing plan (see Section 15).

The PES mechanism (See Section 4.3) will be initially funded by up-front public investment programs (e.g. FIP, CAFI) in order to kick-off forest protection measures and demonstrate the conceptual approach, for example improved livelihoods based on new agricultural practices and PES from forest protection. After the first verification and payments from the Carbon Fund, a share of the ER revenues will be allocated to this PES scheme in order to engage more stakeholders or extend existing PES contracts. The program's implementation arrangements will be designed to oversee and manage all PES contracts in one hand to ensure coordination between up-front and ERPA payments and avoid any double-payments (i.e. multiple payments for the same activity). More specifically, all activities subject to the PES mechanism (regardless of the funding source) will be monitored and reported in a single transparent monitoring report that will establish direct links between activities, (proxy) indicators and payments. Implementation and monitoring will be guided by Standardized Operational Procedures (SOP). The Program Management Unit will be in charge of overseeing and coordinating all executive agencies involved in this mechanism (see Section 6.1).

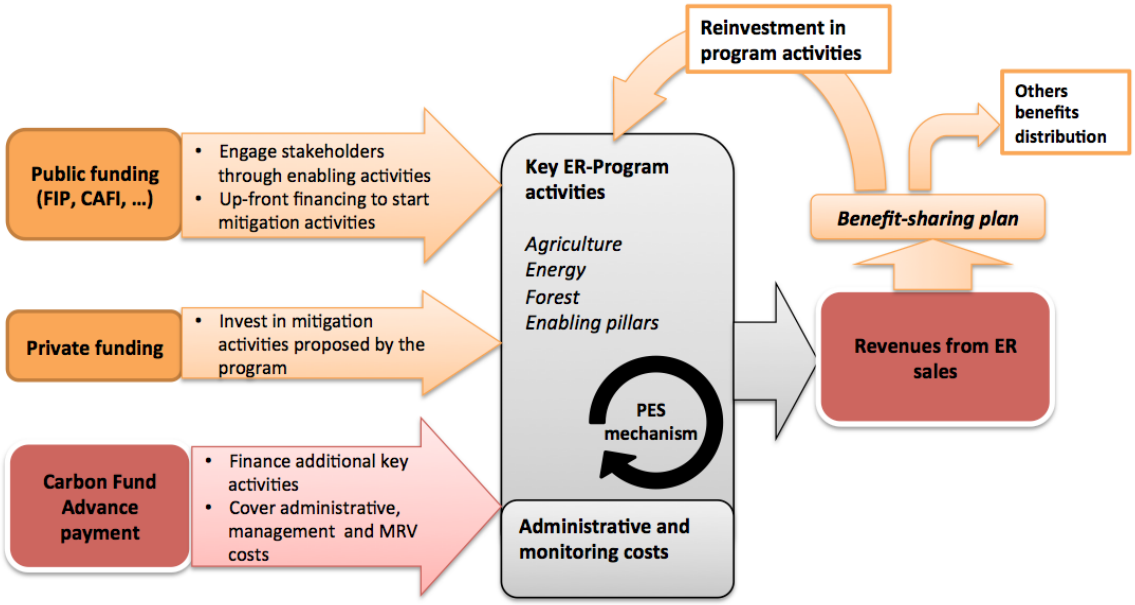


Figure 6ER Program's overall financing strategy

The comprehensive financial plan for the ER program is presented in Annex 1 while further explanations regarding the coordination of up-front finance sources and the requested advance payment follow below. It should be noted that the finance plan presents a highly realistic (e.g. finance sources mostly secured) scenario to embark on a viable program that delivers ERs while the vision is to scale up activities as additional resources are mobilized in order to realize the full ambition of the program**.**

Coordination of up-front (investment-type of) funding

The program's start-up phase will primarily rely on available sources of public and private funding. Therefore, the design phase was used to i) optimize coordination of existing programs and initiatives and ii) mobilize additional resources to ensure a viable program to begin with (in combination with reinvestment strategy and further fundraising as outlined above). The main funding sources incorporated into the program's financial plan are:

- **Forest Investment Program (FIP).** Two components of the FIP project (see Section 4.1) will fund mitigation activities in the Mai-Ndombe Province: Component 1 is an integrated program in the Plateau District (PIREDD Plateau) and component 2a of the FIP targets the cooperation with the private sector through the co-financing of investments and works through calls for proposals. In addition, the Dedicated Grant Mechanism (DGM), a special window under the FIP, will provide grants to Indigenous Peoples including in the Mai Ndombe province.
- **Central African Forest Initiative (CAFI):** Since the FIP's integrated program only covers the Plateau District (PIREDD Plateau), DRC included a complementary integrated program for the Mai Ndombe District (PIREDD Mai Ndombe) in its National REDD+ Investment Plan in order to cover the entire Mai Ndombe Province. The National REDD+ Investment Plan allocates an amount of 30 million US$ for the PIREDD Mai Ndombe to be proposed for CAFI funding in 2016.[38]

[38] The CAFI and DRC government have just signed a Letter of Intent to fund the DRC REDD+ investment plan for an amount of 200 Million US$ for the 2016-2020 period (see Section 2.3).

- **Othersecured public funding** includes an allocation to Mai Ndombe from the Global Environment Facility (GEF) project, the CAFEC project (funded by USAID), and the KFW (funded by the Government of Germany through its International Climate initiative).
- **Private sector funding** comprises the existing WWC REDD+ project but also potential additional funding based on expressions of interest by several companies: (i) A number of forest companies have expressed their interest to implement reduced-impact logging practices, (ii) The company NOVACEL is currently raising private funds to develop industrial agroforestry in savannas, (iii) The company SOCALCO is also raising funds to complement its own investment for an agroforestry project in the Mai-Ndombe province to ensure sustainable supply of wood for its match factory in Kinshasa (See Section 4.1 for further details). The amounts included in the financing plan as private sector contribution are based on initial discussions regarding the companies' engagement as program participants and existing business models.

More specifically, table below provides an overview of the current status of ER-Program up-front finance based on the sources described above:

Table 12 Current status of ER Program Up-front Finance

Type of fund	**Fund sources**	**Million US$**
Secured Grant funding	CAFI - PIREDD Mai Ndombe	30,0
	FIP - PIREDD-Plateau	14,2
	FIP- Component 2a - Co investment with private sector	2,3
	FIP - Dedicated Grant Mechanism	0,8
	Global Environment Facility (GEF) project to support conservation	4,0
	CAFEC USAID on Salonga and Lac Tumba Landscape	2,2
	KFW for Protected Area management on Salonga national park	0,6
	Project Carbon Map and Model financed by KFW	0,4
Secured Private funds secured	WWC	10,0
Expected Private funds	*(current status of interest)*	15,1
Expected advance payment	FCPF Carbon Fund	9,8
	Total	89,3

A more comprehensive overview on the breakdown of the startup funding according to the program's main activities can be found in Annex 12.

Advance payments from the Carbon Fund

The DRC is requesting an advance payment from the Carbon Fund in order to i) cover the costs related to the ER-Program management and monitoring and ii) bridge an investment gap (before reinvestment strategy kicks in or additional sources can be mobilized) and finance important activities for the program's

success without delay. The advance payment is proposed to be 10% of the total amount of sales of emission reduction credits through the ERPA[39].

More specifically, the advance obtained from the Carbon Fund will cover management and transaction costs, MRV, continuous consultations and communication, and the operation of the feedback, grievance and redress mechanism (FGRM). In addition, advance payment will support three proposed activities are proposed to be covered by the advance payment to help implement important but at this stage insufficiently financed activities to address the various drivers and underlying causes of deforestation – in particular in the logging sector. While DRC is aware that the advance payment is subject to ERPA negotiations, it considers it as a fundamental component of its finance plan. Alternatives could be reviewed during the ERPA negotiations if needed. Table 13 below shows the budget breakdown for the advance payment from the Carbon Fund.

Table 13*:* Carbon Fund advance payment breakdown

Items	Amount (US $)	Comments
FH1. Strengthening forest and wildlife law enforcement	1 100 000	*75 % of the activity*
FH2. Legal compliance of industrial logging operations	1 500 000	*100% of the activity*
FH3. Development of community forestry.	1 500 000	*50% of the activity*
Administrative costs (Program management and transaction costs)	3 086 000	*Total amount for 5 years ERPA Period*
Feedback and grievance redress mechanism and consultations/communication	1 503 600	
Monitoring, Reporting and Verification costs	1 028 817	
Total	**9 718 417**	

Emission Reduction sales and impact on the financing plan

This financial plan over 10 years also simulates reinvestment of a portion of revenues issued from Emission Reduction Credits in the key activities of the program (see Section 15 on benefit-sharing).It is currently based on the assumption of a total sale of 15 million tCO2 at 6,5$/tCO2.[40]

The program will actively seek other Emission Reduction buyers (Green Climate Fund, voluntary or regulative Carbon markets) in order to increase its reinvestment capacity and its impact on deforestation. The following chart illustrate the impact on Emission reduction after 10 years for different scenario of purchasing volume during the first 5-years period (15, 20 and 25 MtCO2). In the case of a purchasing volume of 25 MtCO2, the ER-Program could generate 160 MtCO2 after 10 years compared to 115 MtCO2 if the purchase volume is limited to the ERPA with the Carbon Fund.

[39] Subject to ERPA negotiations.

[40] Subject to ERPA negotiations.

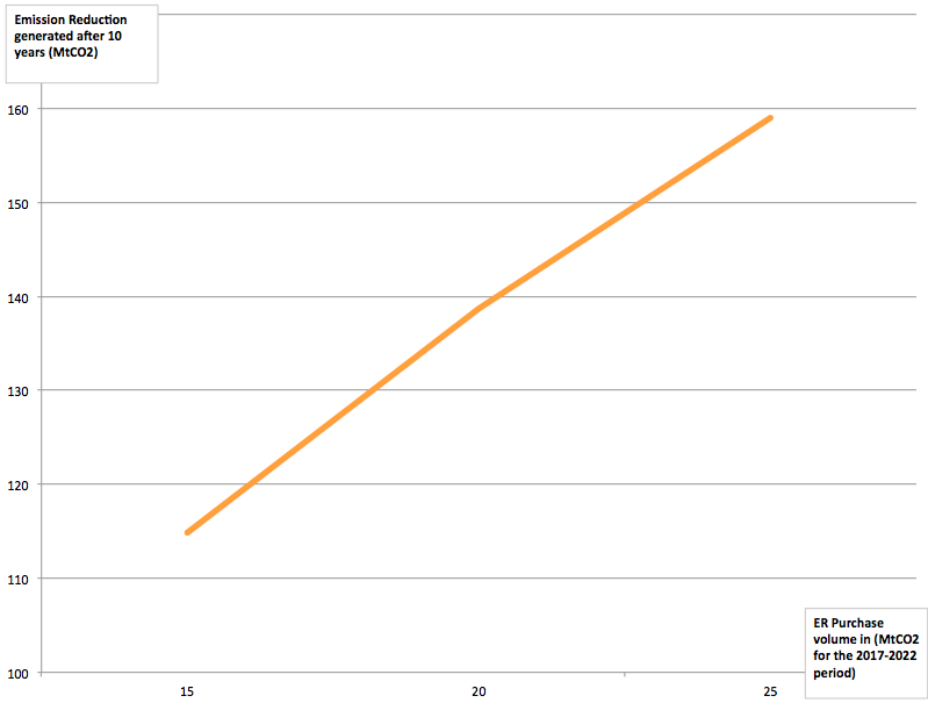


Figure 7: Long-term ER potential for different scenario of ER purchasing volume

7.CARBON POOLS, SOURCES AND SINKS

7.1 DESCRIPTION OF SOURCES AND SINKS SELECTED

In response to indicator 3.1 of the methodological framework (MF), the ER-Program *identifies which anthropogenic sources and sinks associated with any of the REDD+ Activities will be accounted for in the ER Program. Table* illustrates the REDD+ activities (adopted by **1/CP.16, paragraph 70**) selected by the ER-Program and thus the associated emission sources and sinks.

The following table briefly discusses which carbon sinks and sources are included or excluded:

Table 14: Sources and Sinks accounted for under the ER-Program

Sources/Sinks	Included?	Justification / Explanation
Emissions from deforestation	Yes	According to the MF, ER programs must account for deforestation. Emissions from deforestation are identified as GHG emissions from the IPCC Land Use change category forest land to non-forest land.
Emissions from forest degradation	Yes	The ER Program also accounts for emissions from forest degradation. These are defined as GHG emissions from the IPCC Land Use change category forest land remaining forest land caused by long term losses in forest carbon stocks. Within the framework of the ER Program these are characterized by transitions between Primary forest to Secondary Forest which comply with this definition. According to the REL calculation, emissions from degradation account for approx. 40% of all forest-related emissions in the reference period (2004-2014) so they are considered to be significant (>10% of all forest-related emission in the reference period).
Removals from enhancement of carbon stocks	Yes	The ER-Program accounts for GHG removals as a result of: • Conversion of non-forest land to forest land as defined by the IPCC whether natural, natural assisted or of anthropogenic origin; • Regrowth on forest land remaining forest land as defined by the IPCC, which in the framework of the ER Program are defined as transitions from secondary forests to primary forests.
Emissions and removals from	No	There is not a national definition for this REDD+ activity. However, there is a comprehensive accounting for GHG emissions and removals from forests so GHG

Table 14: Sources and Sinks accounted for under the ER-Program

Sources/Sinks	Included?	Justification / Explanation
conservation of carbon stocks		emissions and removals that could potentially be included in this activity are included in previous REDD+ activities.
Emissions and removals from sustainable management of forest	No	There is not a national definition for this REDD+ activity. However, there is a comprehensive accounting for GHG emissions and removals from forests so GHG emissions and removals that could potentially be included in this activity are included in previous REDD+ activities.

7.2 DESCRIPTION OF CARBON POOLS AND GREENHOUSE GASES SELECTED

This section outlines which carbon pools and which greenhouse gases (GHG) are included or excluded under the ER Program. Generally, the exclusion carbon pools is justified by the argument of conservativeness, i.e. that the exclusion will underestimate emissions in the REL (in line with indicator 4.2 ii of the MF). Hence, where the exclusion is justified by conservativeness, no additional proof of (in) significance is provided.

Table 15: Carbon Pools accounted for under the ER-Program

Carbon Pools	Selected?	Justification / Explanation
Above Ground Biomass (AGB)	Yes	Emissions from AGB constitute the majority of emissions from all baseline activities within the ER-Program accounting area and are thus considered to be significant (>10% of total forest related emissions in the Accounting Area during the Reference Period). Likewise, emissions reductions and removals in the Program scenario are expected to result in a major increase of the AGB carbon pool compared to the reference emission level. In consequence, this pool must be included.
Below Ground Biomass (BGB)	Yes	The ER-Program makes use of root-shoot ratios with an order of magnitude of 20-40% of AGB, This means that emissions from BGB constitute a significant carbon pool (>10% of total forest related emissions in the Accounting Area during the Reference Period). Likewise, emissions reductions and removals in the Program scenario are expected to result in a major increase of the AGB carbon pool and hence also the BGB carbon pool compared to the reference emission level. In consequence, this pool must be included.

Table 15: Carbon Pools accounted for under the ER-Program

Carbon Pools	Selected?	Justification / Explanation
Dead Wood	No	For the activities "reducing emissions from deforestation" and "enhancement of carbon stocks" in non-forest land the exclusion of dead wood would be conservative. In the former, dead wood stocks are higher in forest than in non-forest so conversion from one to another would result in emissions which would be reduced by the activities of the ER program. Moreover, this assumption is confirmed by the 2006 IPCC GL (Vol. 4, chapter 2, page 2.25, section 2.3.2.2, 2nd paragraph[41]) that preconizes that in the forestland to non-forestland IPCC category it must be assumed that the DOM pools in non-forest land categories after the conversion are zero, i.e., they contain no carbon. In the latter, it is expected that the amount of dead wood would increase as forestlands have higher carbon stocks than non-forestlands. For the activities occurring in forestland remaining forestland such as "reducing emissions from degradation" and "enhancement of carbon stocks" in forestland, the dead wood pool would not be significant as indicated by the 2006 IPCC GL. According to the IPCC 2006 guidelines (Vol. 4, chapter 2, page 2.21, section 2.3.2.1, 2nd paragraph), [...] countries that use Tier 1 methods[42] to estimate DOM pools in land remaining in the same land-use category, report zero changes in carbon stocks or carbon emissions from those pools [...], therefore, emissions from dead wood pool in forestland remaining forestland would be zero. Based on the rationale provided above, the ER-Program does not account for the deadwood carbon pool.
Litter	No	In line with the above, the exclusion of this pool is expected to be conservative for the activities "reducing emissions from deforestation" and "enhancement of carbon stocks" in non-forestland as the ER program is going to reduce emissions or enhance removals from this carbon pool so its exclusion would reduce the emission reductions generated by the ER program. As indicated in the previous pool for forestland remaining forestland REDD+ activities, the dead organic matter pool is not significant as GHG emissions may be assumed to be zero. According to the IPCC 2006 guidelines, (Vol. 4, chapter 2, section 2.2.1, page 2.9, 2nd bullet point), *[...] under Tier 1, dead wood and litter pools are often lumped together as 'dead organic matter' [...] (DOM),* so the above applies to the litter carbon pool.

[41] [...] the Tier 1 assumption is that DOM pools in non-forest land categories after the conversion are zero, i.e., they contain no carbon. The Tier 1 assumption for land converted from forest to another land-use category is that all DOM carbon losses occur in the year of land-use conversion [...].

[42]In accordance with Point 18 (page 37) of the Carbon Fund methodological framework, IPCC Tier 2 method is defined as a method [...] use of the same methodological approach as Tier 1 but applies emission factors and activity data which are defined by the host country for the most important land uses or activities [...].

Table 15: Carbon Pools accounted for under the ER-Program

Carbon Pools	Selected?	Justification / Explanation
		In consequence, the ER-Program does not account for the litter carbon pool.
Soil Organic Carbon (SOC)	No	For REDD+ activities occurring in forestland remaining forestland GHG emissions may be assumed to be zero in accordance with the 2006 IPCC GL[43]. In REDD+ activities in forestland to non-forestland and non-forestland to forestland, it is expected that these will lead to less areas deforested (largely by burning), i.e. emissions from the soil organic carbon pool will be lower in the program scenario compared to the baseline scenario. As such omission of this pool is conservative, because program emissions are very likely to be lower than baseline emissions (REL), i.e. emission reductions will be underestimated. This is in line with indicator 4.2 ii of the MF.

The ER Program accounts for the following greenhouse gases:

Table 16: Greenhouse Gases accounted for under the ER-Program

Greenhouse gases	Selected?	Justification / Explanation
CO_2	Yes	The ER Program shall always account for CO_2 emissions and removals
CH_4	No	The ER Program's mitigation activities will result in a less areas burnt. The emissions related to burning are conservatively neglected.
N_2O	No	The ER Program's mitigation activities will result in a less areas burnt. The emissions related to burning are conservatively neglected.

[43]Forest soil carbon stocks do not change with management according to Tier 1 assumption provided in Section 4.2.3.1 - Chapter 4 – Volume 4 – 2006 IPCC GL

8. REFERENCE LEVEL

8.1 REFERENCE PERIOD

The Methodological Framework (MF) of the FCPF, Indicator 11.1 notes: '*The end-date for the Reference Period is the most recent date prior to 2013 for which forest-cover data is available to enable IPCC Approach 3. An alternative end-date could be allowed only with convincing justification, e.g., to maintain consistency of dates with a Forest Reference Emission Level or Forest Reference Level, other relevant REDD+ programs, national communications, national ER program or climate change strategy*'.

Considering the above guidance and national / local circumstances, DRC will apply a reference period from 2004 to 2014 for its Mai-Ndombe ER-Program. This is done in order to ensure consistency with the national FREL/FRL, which will be submitted in September 2016 to the UNFCCC:

- As part of the national process for the development of the national FREL/FRL supported by FAO, it was decided in 2014 when that process was first started, that the reference period would end in 2014. This resulted in a number of technical decisions :
    - A sub-national 2014 forest cover benchmark Map for the Old Bandundu province would be produced by DIAF with technical support of the Japanese International Cooperation Agency (JICA)
    - A national forest cover benchmark Map for the year 2014 would be produced by DIAF with technical support of FAO
    - A biomass map for the year 2014 would be produced based on a LiDAR collection campaign (see map Annex 19).
- Consistent with this, DRC **decided in April 2014 to use a historic reference period from 2004 to 2014 in order to align the end-date of the reference period with the national FREL/FRL**.
- In order to formalize the above, in consultation with stakeholders and with the support from FAO, DRC decided in November 2015 that **the reference period for the national FREL/FRL would be 2000-2014,** allowing the start date and end date to coincide with the national forest cover maps produced by DIAF. This decision has been presented during the UNFCCC COP21 in Paris in a methodological note describing features of the national FREL/FRL.

Although a 2014 end date was decided for consistency with the national FREL/FRL, this end-date is justified for other reasons:

- Using a reference period which ends 2 years before the operational ER Program start date (2016) and 3 years from the ERPA start date mitigates the inaccuracy of the 5 year gap that would be created by maintaining a 2012 end date.

- An end date of 2014 ensures that assessment of carbon stocks is up to date (e.g. the average carbon stock for forest strata may change over time, which could have minor impacts on the Emission Factors). Temporal alignment between the end of the reference period and the measurement of carbon stock data minimizes such effects. Equally important, the REL envisages measurement of conversion of Savannah to forest under the ER Program's A/R activities. For this reason, temporal alignment between the end of the historic reference period and carbon stock data is also of advantage. Finally, choosing a 2014 end date offers the important co-benefit that the ER Program presents the alignment of the FCPF and VCS-JNR reference levels. (Because VCS JNR requires a maximum difference of 10 years between the historical reference period end-date and the start of the ER program).

Although the reference period end date would be temporally aligned in both sub-national and national RL, the ER Program start date would differ. In order to maximize consistency with the national REL, collaboration with FAO and DIAF has resulted in a mutual agreement by to use the 2004-2014 samples used by the ER-Program to calculate the sub-national REL to conduct an accuracy assessment of the 2000-2014 Land Cover Change (LCC) map in the ER-Program area. These accuracy values will then in turn be used to adjust national map deforestation area results for the Mai Ndombe province. (See Section 8.6 below).

8.2 FOREST DEFINITION USED IN THE CONSTRUCTION OF THE REFERENCE LEVEL

DRC submitted a host country specific definition to UNFCCC[44]that was applied in the design of the Jurisdictional ER Program. Respective minimum values for crown cover, tree height and area according to the official DRC forest definition are as follows:

Table 17: Forest Definition of DRC

Item	**Value**
Minimum Crown Cover (%)	30%
Minimum Land Area (ha)	0.5
Minimum Tree Height (m)	3

This forest definition was applied in order to conduct the analysis of forest cover and forest cover change. Forest was further stratified in Primary forest and secondary forest (see definition in **Table *18***) in order to enable the estimation of forest degradation and enhancement of carbon stocks in existing forests.

Table 18: Land Use / Land Cover categories

Land Use Land Cover class	**Description**

[44] Submitted under the framework for the Clean Development Mechanism. It was decided its application as part of the national REDD+ program.

Primary forest	This category consists of all forests without a significant human influence and it includes old growth *terra firme* forest, semi-deciduous forests and swamp forests. This class is identified in satellite imagery by its distinct color (deep green), roughness and the shape of its patches. Analysts are instructed to estimate canopy cover based on forest definition, but ultimately use all contextual information available to them to perform ocular separation of this category from secondary forest.
Secondary Forest	This category consists of all forests, which are not primary forests, and it includes all secondary and degraded forests. Secondary forests are those forests regenerated after forest clearing and degraded forests are those forests that have been disturbed but in which the vegetation has never been under the thresholds of the forest definition. Secondary forest is identified in satellite imagery primarily using an image enhancement technique developed at the University of Kinshasa. Histogram equalization results in the enhancement and separation of secondary forest by causing it to appear as a yellow color, rendering it clearly separable from primary forest. Analysts are similarly trained to identify the lower bound of secondary forest class by estimating crown cover, but they are ultimately instructed to use all contextual information available to them.
Non-Forest	This category includes all lands that contain vegetation under the thresholds of the forest definition. It includes the following sub-classes: Cropland; Grassland; Wetland/Water; Settlement; Bare Soil; and Burn Scar. This class is identified in satellite imagery by its brown to red color, roughness (smooth, except for sparse vegetation) and its boundary with primary and secondary forests (forest edge shadows, etc.). The upper bound of the non-forest class is identified by estimating canopy cover, but ultimately analysts are instructed to use all contextual information available to them.

Land Use / Land cover categories were identified using a manual / visual interpretation, in which analysts were trained according to a robust set of rules allowing them to identify and distinguish common land cover categories present in the Mai Ndombe forest. These rules were developed and based on the definition shown above. The analysts were trained to estimate the criteria listed above for the national forest definition in addition to a host of additional contextual criteria, described exhaustively in the analyst training manual (see Annex 18) for full description of land cover category classification rules). Analysts were instructed to identify forest categories by estimating canopy cover, as well as multiple additional identifying factors within the remote sensing imagery, including color, shape, proximity to identifiable objects, roughness and other physical features typical to manual classification models. Land cover classification accuracy was assured using a multi-tiered quality assurance process, beginning with internal "amelioration" of impossible and questionable land cover transition profiles and ultimately via a traditional accuracy assessment based on Olofsson et al, 2014, which will be used to adjust the reference level rate results. Table 15 indicates the canopy cover thresholds that the analysts are trained to consider when identifying land cover categories throughout the manual / visual classification process. Although analysts cannot estimate exact canopy cover percentage, they are trained to estimate it to a high degree of accuracy by considering color, presence of shadow, roughness and other contextual information available to them. The analyst training manual (see Annex 18)describes these land cover identification techniques in full, and analysts are trained and tested on their expert knowledge as well as their ability to correctly identify land cover categories.

8.3 AVERAGE ANNUAL HISTORICAL EMISSIONS OVER THE REFERENCE PERIOD

DESCRIPTION OF METHOD USED FOR CALCULATING THE AVERAGE ANNUAL HISTORICAL EMISSIONS OVER THE REFERENCE PERIOD

Criterion5 of the MF requests that *[...] The ER Program uses the most recent Intergovernmental Panel on Climate Change (IPCC) guidance and guidelines, as adopted or encouraged by the Conference of the Parties as a basis for estimating forest related greenhouse gas emissions by sources and removals by sinks [...].*

UNFCCC Decision 2/CP.13 paragraph 6 *[...] encourages the use of the most recent reporting guidelines as a basis for reporting greenhouse gas emissions from deforestation, noting also that Parties not included in Annex I to the Convention are encouraged to apply the Good Practice Guidance for Land Use, Land-Use Change and Forestry [...].*

On the most recent reporting guidelines for reporting greenhouse gas emissions from deforestation, UNFCCC Decision 17/CP.8, including FCCC/CP/2002/7/Add.2, states that *[...]Non-Annex I Parties should use the Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories [...].*

To summarize, the Democratic Republic of the Congo as a non-Annex I country should use the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* and is encouraged to use the 2003 IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*

Despite this, the ER-Program has voluntarily opted to make use of data and methods as set out in the 2006 IPCC guidelines. This should be regarded as a voluntary commitment to increase the accuracy of reporting on emission sources and sinks.

Based on the identification of the drivers of deforestation and forest degradation (section 4.1), the ER-Program in the following provides an overview of the 2006 IPCC methods used for GHG estimation in the ER-Program area. A detailed description of the methodologies is provided in the following subsection (8.3.2)

The methodology used to quantify the REL for DEF/DEG is - by IPCC definition –a so-called gain-loss methods, since the methodology is a process-based approach, which estimate the net balance of additions to and removals from a carbon stock (cp. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 2, page 2.9 ff). See Table 19 for an overview.

Table 19: IPCC equations used to quantify emission and removals for the REL

REDD+ activity (sources & sinks)	Equation from the 2006 IPCC guidelines used as a basis for GHG estimation (for AGB and BGB)	Reference to 2006 IPCC guidelines
General	Equation 2.2 Equation 2.3	Vol. 4, chapter 2, section 2.2.1, page 2.7
Emissions & removals from deforestation and	Equation 2.15	Vol. 4, chapter 2, section 2.3.1.2, page 2.20

enhancement of forest carbon stocks (forest land to non-forest land and vice versa)	Equation 2.16	Vol. 4, chapter 2, section 2.3.1.2, page 2.20
Removals from forest degradation (forest land remaining forest land)	Equation 2.7	Vol. 4, chapter 2, section 2.3.1.1, page 2.12

The annual changes in carbon stocks over the reference period in the Accounting Area ($\Delta \boldsymbol{C_{LU}}$) are equal to the sum of annual change in carbon stocks for each of the $\boldsymbol{i}$ REDD+ activities ($\Delta \boldsymbol{C_{LU_i}}$).

$$\Delta \boldsymbol{C_{LU}} = \sum_{\boldsymbol{i}} \Delta \boldsymbol{C_{LU_i}} \qquad \textbf{EQ 1}$$

(Equation 2.2, 2006 IPCC GL)

Following the IPCC notation, the sum of annual change in carbon stocks for each of the $\boldsymbol{i}$ REDD+ activities ($\Delta \boldsymbol{C_{LU_i}}$) would be equal to the annual change in carbon stocks in the aboveground biomass carbon pool ($\Delta \boldsymbol{C_{AB}}$) and the annual change in carbon stocks in belowground biomass carbon pool ($\Delta \boldsymbol{C_{BB}}$) accounted.

$$\Delta \boldsymbol{C_{LU_i}} = \Delta \boldsymbol{C_{AB}} + \Delta \boldsymbol{C_{BB}} = \Delta \boldsymbol{C_B} \qquad \textbf{EQ 2}$$

(Equation 2.3, 2006 IPCC GL)

The equations for the different REDD+ activities are provided below:

Reducing emissions from deforestation (Forestland to Other Land)

Following the 2006 IPCC Guidelines the annual change in carbon stocks in biomass on forestland converted to other land-use category ($\Delta \boldsymbol{C_B}$) would be estimated through the following equation:

$$\Delta \boldsymbol{C_B} = \Delta \boldsymbol{C_G} + \Delta \boldsymbol{C_{CONVERSION}} - \Delta \boldsymbol{C_L} \qquad \textbf{EQ 3}$$

(Equation 2.15, 2006 IPCC GL)

Where:

$\Delta \boldsymbol{C_B}$ = Annual change in carbon stocks in biomass on land converted to other land-use category, in tones C yr^{-1}

$\Delta \boldsymbol{C_G}$ = Annual increase in carbon stocks in biomass due to growth on land converted to another land-use category, in tones C yr^{-1}

$\Delta \boldsymbol{C_{CONVERSION}}$ = Initial change in carbon stocks in biomass on land converted to other land-use category, in tones C yr^{-1}

$\Delta \boldsymbol{C_L}$ = Annual decrease in biomass carbon stocks due to losses from harvesting, fuel wood gathering and disturbances on land converted to other land-use category, in tones C yr^{-1}

Following the recommendations set in chapter 2.2.1 of the GFOI Methods Guidance Document[45] for applying IPCC Guidelines and guidance in the context of REDD+, the above equation will be simplified and it will be assumed that: a) the annual change in carbon stocks in biomass ($\Delta \boldsymbol{C_B}$) is equal to the initial change in carbon stocks ($\Delta \boldsymbol{C_{CONVERSION}}$); b) it is assumed that the biomass stocks immediately after conversion is the biomass stocks of the resulting land-use. Therefore, the annual change in carbon stocks would be estimated as follows:

$$\Delta \boldsymbol{C_B} = \Delta \boldsymbol{C_{CONVERSION}} \qquad \textbf{EQ 4}$$

$$\Delta \boldsymbol{C_{CONVERSION}} = \sum_{\boldsymbol{j}} \left\{ \left(\boldsymbol{B_{AFTER,j}} - \boldsymbol{B_{BEFORE,j}} \right) \times \Delta \boldsymbol{A_j} \right\} \times \boldsymbol{CF}$$ (Equation 2.16, 2006 IPCC GL)

Where:

$\boldsymbol{B_{AFTER,j}}$ = biomass stocks on land use transition j immediately after the conversion, tones DM. ha^{-1}.

$\boldsymbol{B_{BEFORE,j}}$ = biomass stocks on land use transition j before the conversion, tones d.m. ha^{-1}.

$\Delta \boldsymbol{A_j}$ = Area of Land Use subcategory / stratum converted to another Land Use subcategory / stratum (transition denoted by j) in a certain year, ha yr-1.

$\boldsymbol{CF}$ = Carbon fraction of dry matter, tone C (tone d.m.)$^{-1}$.

The above equation could be modified and expressed as an emission factor ($\boldsymbol{EF_j}$) times activity data ($\boldsymbol{S_{m,j}}$). Since GHG emissions have to be reported in terms of tCO_2e the emission factor may be reported directly in terms of tCO_2e.

$$\Delta \boldsymbol{C_B} = \sum_{\boldsymbol{j}} \left\{ \boldsymbol{EF_j} \times \Delta \boldsymbol{A_j} \right\} \qquad \textbf{EQ 5}$$

Where:

$\boldsymbol{EF_j}$ = Emission factor for transition j, tones CO2 ha^{-1}. In the context of deforestation it could either deforestation of primary forest ($\boldsymbol{EF_{DEF}}$) or deforestation of secondary forest ($\boldsymbol{EF_{SDEF}}$)**.** See section 0 for more detail.

$\Delta \boldsymbol{A_j}$ = Area of Land Use subcategory / stratum converted to another Land Use subcategory / stratum (transition denoted by j) in a certain year, ha yr-1. See section **0** for more detail.

Reducing emissions from forest degradation (forestland remaining forestland)

Following the 2006 IPCC Guidelines the annual change in carbon stocks in biomass on forestland remaining forestland ($\Delta \boldsymbol{C_B}$) could be estimated through the Gain-Loss Method or the Stock-Difference Method as described in Chapter 2.3.1.1 of Volume 4 of the 2006 IPCC Guidelines.

[45]Page 44, GFOI (2013) Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests: Methods and Guidance from the Global Forest Observations Initiative: Pub: Group on Earth Observations, Geneva, Switzerland, 2014.

$$\Delta C_B = \Delta C_G - \Delta C_L$$ **EQ 6**

(Equation 2.7, 2006 IPCC GL)

$$\Delta C_B = \frac{(C_{t_2} - C_{t_1})}{(t_2 - t_1)}$$ **EQ 7**

(Equation 2.8 (a), 2006 IPCC GL)

Where:

ΔC_B = Annual change in carbon stocks in biomass for each land sub-category, in tones C yr^{-1}

ΔC_G = annual increase in carbon stocks due to biomass growth for each land sub-category, considering the total area, tones C yr-

ΔC_L = annual decrease in carbon stocks due to biomass loss for each land sub-category, considering the total area, tones C yr-1

C_{t_2} = total carbon in biomass for each land sub-category at time t_2, tonnes C

C_{t_1} = total carbon in biomass for each land sub-category at time t_1, tonnes C

Following the recommendations set in chapter 2.2.2 of the GFOI Methods Guidance Document[46] for applying IPCC Guidelines and guidance in the context of REDD+, the above equation will be simplified and it will be assumed that: a) the annual change in carbon stocks in biomass (ΔC_B) due to degradation is equal to the annual decrease in carbon stocks (b) the decrease in carbon stocks occurs the year of conversion. The long-term decrease in carbon stocks indicated in equation (1) of the GFOI MGD is assumed here to be zero. Therefore, considering the GFOI MGD the IPCC equation for forest degradation could be expressed as an Emission Factor time activity data as follows:

$$\Delta C_B = \sum_j \{EF_j \times \Delta A_j\}$$ **EQ 8**

Where:

EF_j = Emission factor for deforestation of forest type j, tones CO2 ha^{-1}. j could be for degradation of primary forest (EF_{DEG}). See section **0** for more detail.

ΔA_j = Area of Land Use subcategory / stratum converted to another Land Use subcategory / stratum (transition denoted by j) in a certain year, ha yr-1. See section **0** for more detail.

Enhancement of carbon stocks in existing forests (forestland remaining forestland)

[46]Page 48, GFOI (2013) Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests: Methods and Guidance from the Global Forest Observations Initiative: Pub: Group on Earth Observations, Geneva, Switzerland, 2014.

Following the recommendations set in Chapter 2.2.3[47] and the most complete guidance set in chapter 3.1.3 of the revised GFOI MGD[48], enhancement of carbon stocks in existing forests will be estimated using the same methods as for forest degradation. However, it will be assumed that the change in carbon stocks from secondary forest to primary forest does not occur the year of observation but gradually in a period of time (10 years) as recommended by the 2006 IPCC GL. From the point of view of notations, the emission factor in equation EQ13 above would be replaced by removal factor $\mathbf{RF}_{REG}$.

Enhancement of carbon stocks in new forests (non-forestland to forestland)

Following the recommendations set in chapter 2.2.5 of the GFOI Methods Guidance Document[49] and the most complete guidance set in chapter 3.1.4 of the revised GFOI MGD[50], enhancement of carbon stocks in new forests will be estimated using the same methods as for deforestation. However, it will be assumed that the change in carbon stocks from non-forest to secondary forest in the latter do not occur the year of observation but gradually over a period of time (10 years) as recommended by the 2006 IPCC GL. From the point of view of notations, the emission factors in equation EQ5 above would be replaced by $\mathbf{RF}_{SREG}$ in enhancement of carbon stocks in new forests.

ACTIVITY DATA USED FOR CALCULATING THE AVERAGE ANNUAL HISTORICAL EMISSIONS OVER THE REFERENCE PERIOD

Sample design

To calculate the REL (for deforestation and degradation), we employed a systematic, manual classification approach, consistent with IPCC Tier 3, to sample data covering multiple years over the historical reference period. We employed a state-change model on the sampled data to calculate area deforested and degraded. As a pre-requisite for designing the sampling scheme, we stratified the Mai Ndombe ER Program area into land-use/land-cover pairs, ultimately consolidating into 6 regional sampling strata.

Core land cover strata were derived from a land cover map provided by the Université Catholique de Louvain. Edge strata were then created by iteratively buffering the core strata until the edge strata were observed to cover most deforestation for a recent image (a 2014 Landsat mosaic was used to identify deforestation extent). We thereby ensured that deforestation activity was covered by the edge strata, for which we assigned a higher number of samples than for the core strata (see below). We sampled each of these 6 areas with sample spacing proportional to the relative importance of the strata to deforestation and degradation. Table 20 below contains sample spacing strata and sample spacing for each is shown below:

[47]Page 53, GFOI (2013) Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests: Methods and Guidance from the Global Forest Observations Initiative: Pub: Group on Earth Observations, Geneva, Switzerland, 2014.

[48] Page 99 of GFOI MGD, Version 2. Not published at the time of this version of the ER-PD.

[49]Page 53, GFOI (2013) Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests: Methods and Guidance from the Global Forest Observations Initiative: Pub: Group on Earth Observations, Geneva, Switzerland, 2014.

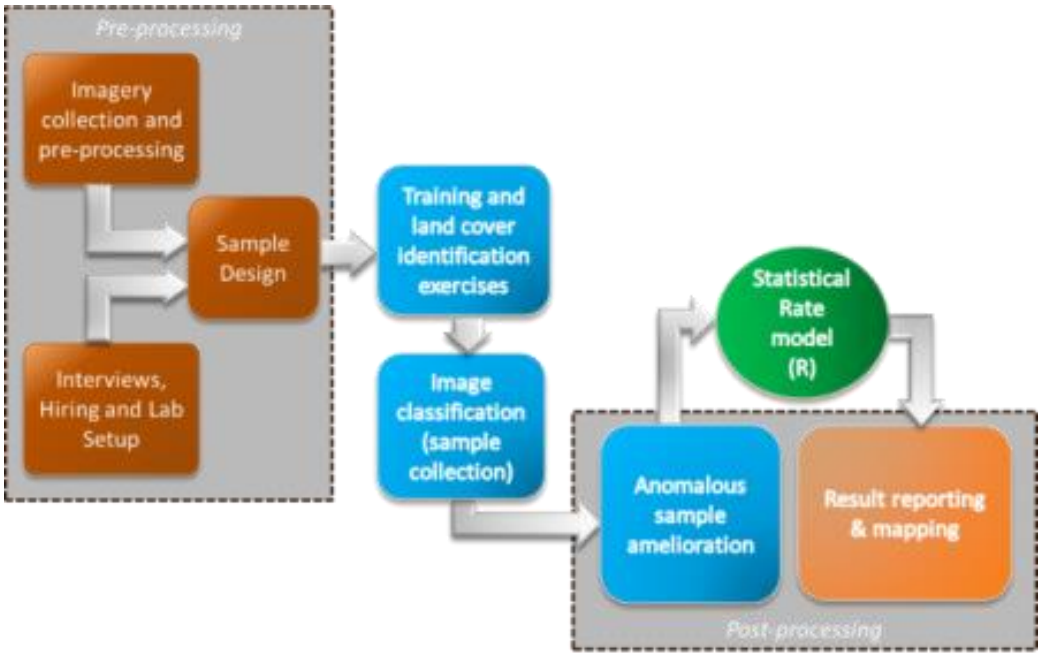
[50] Page 99 of GFOI MGD, Version 2. Not published at the time of this version of the ER-PD.

Table 20: Sample Design summary for the Mai Ndombe ER-Program REL Calculations				
Acronym	**Stratum**	**Area (ha)**	**Sample spacing (m)**	**Nr of Samples**
PFC	Primary forest CORE	3,200,574	5,000	1,285
PFE	Primary forest EDGE	3,062,670	1,600	11,964
NFC	Non-Forest CORE	510,640	1,600	1,988
NFE	Non-Forest EDGE	1,545,971	1,600	6,054
SEC	Secondary Forest	850,279	1,600	3,326
MIX	Agriculture / Forest Mosaic Mixture	3,214,264	1,600	12,535
Total (per image epoch)		**12,384,398**		**37,184**
Grand total (6 epochs)				**223,104**

Sample spacing was designed based on 2 factors. Firstly, the importance of the stratum to deforestation and degradation was considered. As mentioned above, edge strata were assumed to contain more deforestation and degradation than the core strata due to tendency of deforestation to occur at the edge of forest patches in an "impenetrable forest" ecosystem such as that found in the Congo Basin. Deforestation has been shown to occur at an increased rate at forest edges by Bucki et al, 2012 and others. Secondly, sample spacing was rounded to the nearest whole number and then optimized to account for overall number of days allocated for data collection as well as relative number of days allocated for data collection for each of the above-mentioned strata.

WWC managed the sample classification process at the University of Kinshasa in collaboration with the Observatoire Satellital des Forêts d'Afrique Centrale (OSFAC) Laboratory, hiring and training 12 remote sensing analysts that classified the data over a 6-week period under close supervision from WWC. After sample classification, a 2-tiered, internal QA / "amelioration" process was conducted to minimize any individual analyst interpretation errors. We subsequently calculated historical deforestation and degradation rates using the state-change model. We calculated total emissions in tCO_2e (GHG) emitted over the historical reference period due to deforestation and degradation for each of the 6 LULC change strata used to design the sampling scheme. We also calculated percent deforested and degraded per year (%/yr) for each of these same strata. Finally, we aggregated emission (GHG) results and arrived at a single historical deforestation and forest degradation value for the ER-Program area over the historical reference period. Figure 6 illustrates the technical REL calculation workflow process.

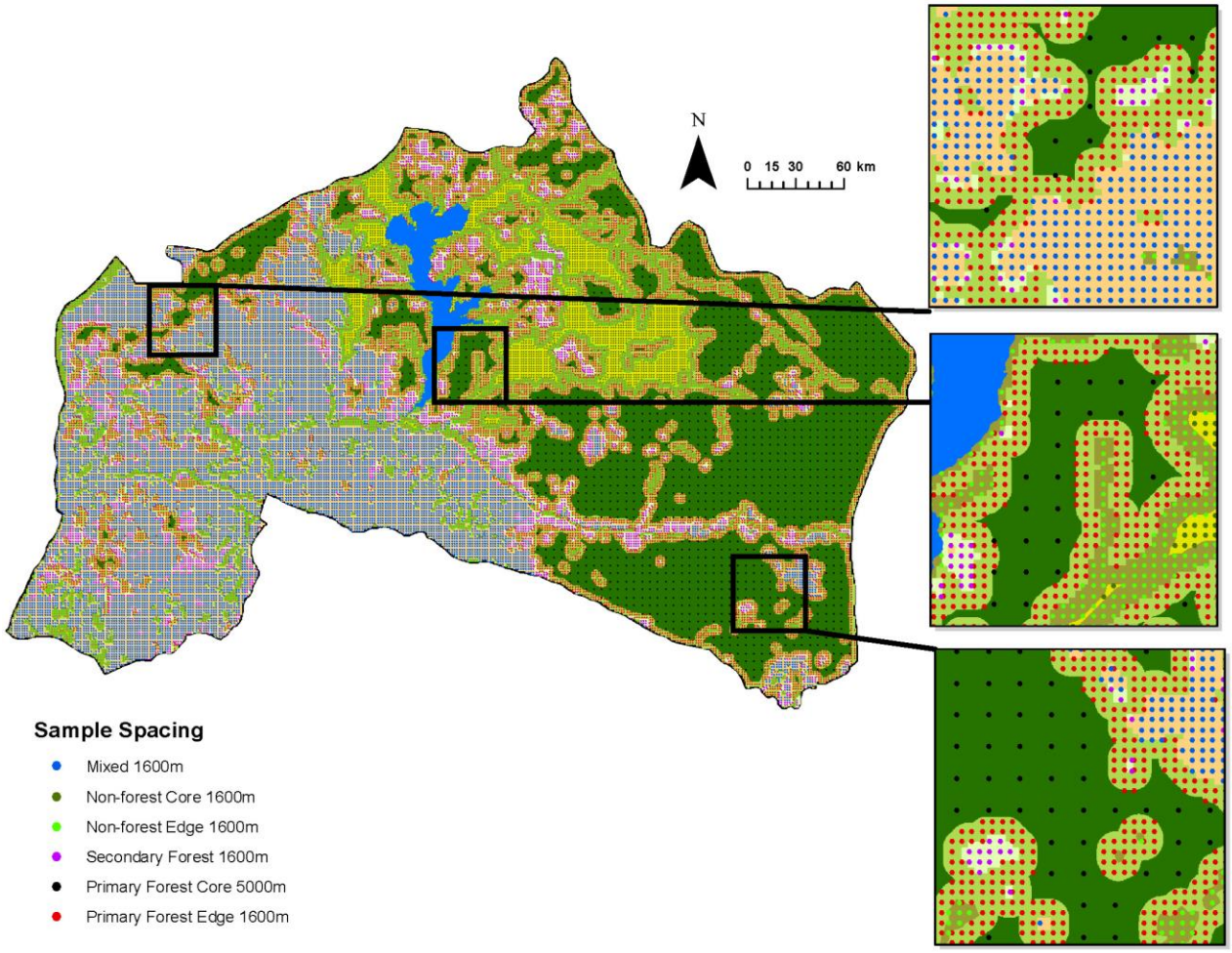
Figure 8: REL Calculation Workflow



Imagery collection and pre-processing

We collected and pre-processed all imagery needed to perform the REL calculation. The imagery was mosaicked (see Annex 15), color corrected and clipped to the Mai Ndombe ER Program area extent and prepared for use with WWC's ArcGIS classification tool. Medium-resolution land-cover stratification was combined with land-use data to create the abovementioned land-use/land-cover pairs (see Figure 9 below). We separated each patch into its core and edge component to support the focus of more samples in the edges of forest strata on the assumption that those areas would have experienced higher levels of deforestation and degradation. Edge strata were created by buffering each patch iteratively until all deforestation that had occurred up until the year 2014 had been covered by the relative edge stratum. This process served to capture all important deforestation events in the edge strata before the end of the historical reference period, thus optimizing the chances of accurately measuring historical deforestation rates.

Figure 9: Regional Strata using Land cover Core and Edge Stratification



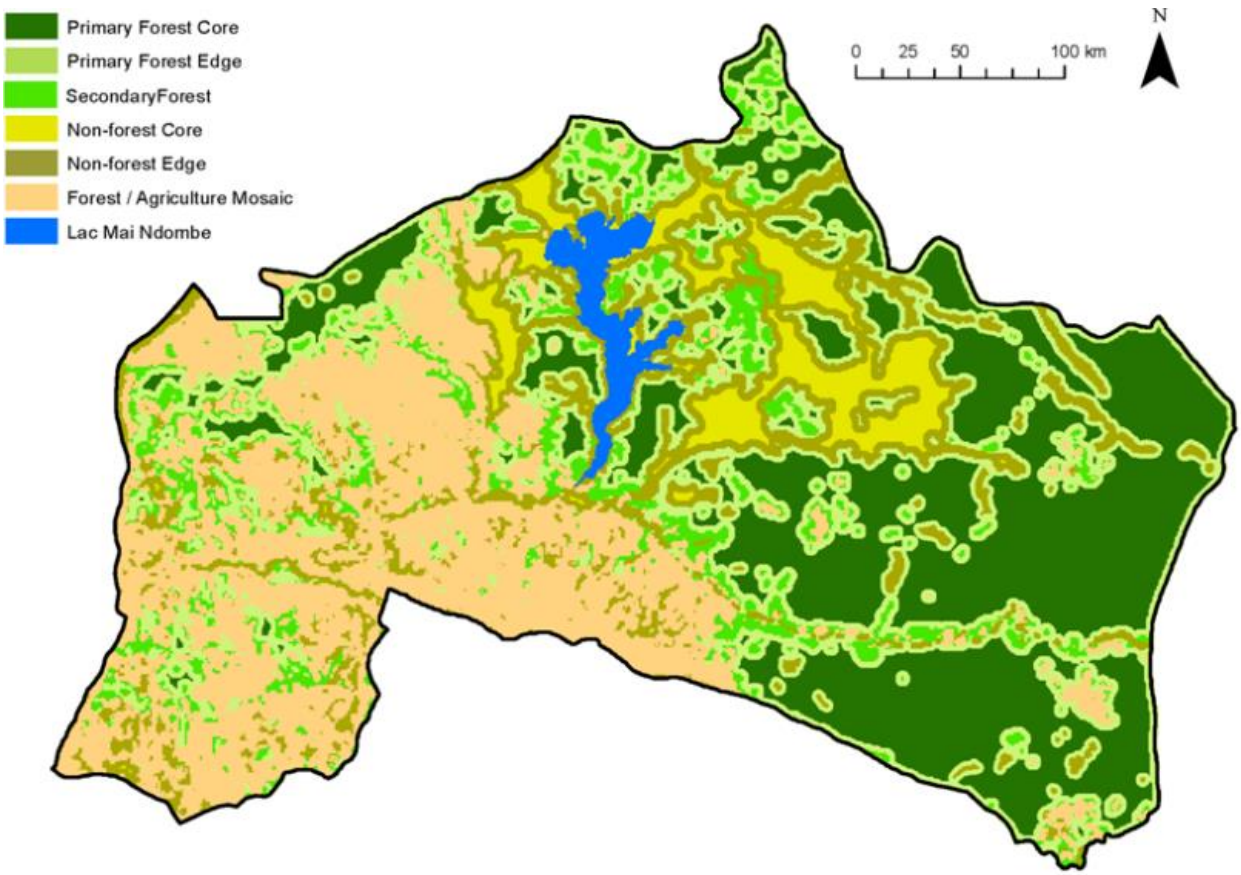
Annex 15 describes how the LULC stratification was used to design the sampling scheme for the Mai Ndombe ER Program. Samples were placed in each regional stratum in a regular grid pattern with a random starting location. Grid spacing was adjusted per the regional stratum's size, and relative expected historical level of deforestation activity.

Collaboration with OSFAC: Capacity Building - The Analyst Pprogram

WWC collaborated with the OSFAC Laboratory at the University of Kinshasa by hiring and training a group of local remote sensing analysts. We held interviews for the analyst positions, and ultimately hired 12 qualified analysts, all of whom had graduated from the University of Kinshasa with a degree in remote sensing / agronomic engineering or were at the end of their studies. Details of the analyst roster are listed in Capacity Building at OSFAC / UniKIN 16.

The analysts were placed in an intensive training session from February 6th to February 13th, during which they studied the WWC training manual, learning the WWC ArcGIS classification tool, as well as numerous examples and criteria for identifying land cover in the Congo Basin. After receiving 3 lectures, the analysts practiced using the GIS tool which they ultimately used for sample classification, and were administered multiple quizzes to determine their readiness to perform production-level data classification. All analysts were required to score at least 90% on each quiz before they could continue in data classification for the

ER-Program. All analysts succeeded in this regard and moved on to complete the sample classification exercise. Images of the analysts engaged in a training session and prior to starting classification are presented in Annex 16. To support the analyst team in their efforts, WWC created a detailed, robust training manual (see Annex 18) and provided various support tools, including the classification "dashboard". The analysts were required to classify thousands of samples, covering all strata and all years, per the Operational Sub-class table in Section 8.2 above.



Map 5: Stratification used for the Design of the Sampling Scheme for Land-use / Land-cover Pairs separated into 'Core' and 'Edge' strata.

Sample classification

All samples were classified manually using a "heads-up" manual/visual classification approach. Analysts viewed samples (each representing a specific point in space) overlaid on remote sensing imagery, and were trained to use a variety of image analysis and enhancement techniques to identify land cover based on the contextual information available to them. Complete, detailed description of such identification techniques lies well beyond the scope of this report, but they include:

- Viewing imagery in both "Truecolor" and "Falsecolor" band combinations
- Utilizing image histogram equalization image enhancement to correctly identify degraded forestland (e.g. secondary forest)
- Use of contextual information, such as color, roughness, shape, shadows, proximity to common objects / areas

- Use of expert knowledge of Congo Basin phenology (temporal vegetation behavior), agronomy and seasonal variation of vegetation
- High resolution image support (when possible)

As mentioned above, all samples were classified per land cover classes derived from IPCC GPG 2006. Analysts used the WWC GIS navigation & classification tool (see Annex 16). For the purposes of the REL calculation, land cover classes were grouped into operational sub-classes to support the state-change model used to calculate deforestation and degradation. Details of IPCC land cover classes, and its aggregation into operational sub-classes for the state-change model (Primary forest, secondary forest and non-forest categories) are provided in Table 18.

Samples were classified over a 30-work-day period. Due to the large number of samples required to be classified for the extent of the Mai Ndombe ER-Program area over the 6 epochs, we employed a zonal approach, breaking the ER-Program area into manageable portions. Using this approach, we could systematically assign different areas of the map to different analysts over different time periods. We made the decision to randomize classification error and mitigate bias by disallowing analysts to classify repeat locations (i.e. classify the same place for more than one epoch) or repeat time-periods (i.e. classify throughout time), assigning entirely random areas to each analyst as well as random time-periods. A total of 223,104 samples were classified, covering the entirety of the Mai Ndombe ER Program area for the 6 epochs selected for analysis over the historical reference period.

Interpretation of the classification results and amelioration

Classified samples were interpreted using a temporal interpretation model requiring temporal transitions between land cover categories (i.e. forest state-change). Transitions for each type of state-change were aggregated. A corresponding emission factor (EF) was then applied to each transition to ultimately calculate total emissions for the REL.

To ensure that the model accurately accounted for all possible types of temporal forest transitions (i.e. mitigation of over- and under-estimation of emissions and elimination of bias) a robust set of "amelioration" rules were applied to each possible temporal forest transition.

Because the sampling approach uses as many points as possible from a temporal perspective (for this REL model, we collected forest state information for 6 points in time), we could conduct robust temporal interpretation of all possible transition profiles. Some examples of common transition profiles are shown in the table below. A 2-tiered amelioration process was employed.

Firstly, to address "impossible" temporal transitions, which are characterized by a state change between Non-forest (N) and Primary Forest (P) in successive time-periods (2 years), we flagged all samples containing such transitions. We firstly identified all such impossible temporal land cover transitions using a customized GIS tool. These transitions were examined using the original Landsat imagery and if necessary, higher resolution imagery to complement the evaluation. These samples were then manually ameliorated through expert review and a group decision-making process that incorporated a combination of expert knowledge of agronomy, Congo Basin forest dynamics and remote sensing expertise.

Secondly, to minimize model bias in either the degradation (loss of carbon) or regrowth (gain of carbon) direction, and to address unlikely temporal forest state transitions, an automated secondary amelioration model was applied. The model employed the following criteria:

a. All transition profiles that contain deforestation, then regrowth to forest followed by another deforestation event were restricted to contain at most one deforestation state change. This was applied to primary deforestation as well as to secondary deforestation and is to ensure that

deforestation and degradation are not over-estimated. Refer to Table 20 below for temporal amelioration examples.

b. Transitions that pass through secondary forest on their way to non-forest are simplified by only observing the deforestation event.

c. Any transition profile containing a regrowth event (i.e. non-forest to secondary forest or secondary forest to primary forest) is ameliorated to follow natural forest regrowth characteristics. We employ the assumption that forest regrowth is not an instant process, but rather takes place over several years. Per IPCC 2006 GPG, humid tropical forest will regrow to its initial carbon stocks over a period of 20 years. We therefore designed emission factors based on this standard regrowth period for both emission and regrowth (removals). See Table below for a complete list of emission factors for all forest state change categories.

d. All transition profiles that contain conversion of primary forest to secondary forest, regrow back to primary forest and are then followed by another degradation event (i.e. "flip-flopping" between primary and secondary forest), are ameliorated to be restricted to contain at the most one degradation event. This avoids the over-counting of emissions for an unstable transition that vacillates between primary forest and secondary forest states. This vacillation is clearly unlikely to occur naturally in the forest, but could easily enter into the REL model due to variations in manual forest classification, especially considering the analysts were only able to see a single time-period for a particular classification session.

Table 21: Temporal Transition Profile Amelioration Process

X = Re-growth removal factor toward secondary forest (REG1) *S = Secondary Forest*
Y = Re-growth removal factor toward primary forest (REG2) *N = Non-forest*
P = Primary Forest

		2004	2006	2008	2010	2012	2014
Deforestation	**Original transition**	P	N	N	S	N	N
	Ameliorated transition	P	N	N	N	N	N
	Original transition	S	N	N	S	N	N
	Ameliorated transition	S	N	N	N	N	N
Regrowth	**Original transition**	S	N	N	S	S	S
	Ameliorated transition	S	N		X	X	X
	Original transition	P	N	S	S	S	S
	Ameliorated transition	P	N	X	X	X	X
	Original transition	N	S	S	S	S	S
	Ameliorated transition	N	X	X	X	X	X
	Original transition	S	P	P	P	P	P
	Ameliorated transition	S	Y	Y	Y	Y	Y
Degradation	**Original transition**	P	S	S	P	S	S
	Ameliorated transition	P	S	S	S	S	S

The transitions represented by the classified samples present 25 possible permutations, which could comprise between two and six observations depending on cloud cover or no-data samples (e.g. samples that fall in Landsat SLC-off stripes or outside image edges). Table 22 below presents the emission factors applied to all possible transitions observed from the manual/visual classification of the REL samples.

Table 22: Possible transitions

Deforestation / Degradation	Regrowth
Land cover change Class	**Land cover change Class**
PN	**SY**
PNX	SYY
PNXX	SYYY
PNXXX	SYYYY
PNXXXX	SYYYYY
PS	**NX**
PSY	NXX
PSYY	NXXX
PSYYY	NXXXX
PSYYYY	NXXXXX
SN	
SNX	
SNXX	
SNXXX	
SNXXXX	

The amelioration process effectively mitigates REL model bias by ensuring that emission factors are applied to temporal transitions in a physically accurate manner, favoring neither the degradation or regrowth process, but accurately calculating total *net emissions* during the reference period.

Equations used to calculate Activity Data

We employ a state-change model, which first calculates a deforestation, degradation or regrowth area for each individual sample. Per-sample deforested area is then aggregated to the strata level, and finally, to the ER-Program level.

Firstly, each sample is assigned a representative area, which is defined as the number of samples in the strata divided by the area of the strata. If an individual sample is found to have undergone a state change between a forest state and non-forest (PF → NF or SF → NF) that sample is flagged as "deforestation". If an individual sample is found to have undergone a state change within a forest state that sample is flagged either as "degradation" (PF → SF) or "primary regrowth (SF → PF). If an individual sample is found to have undergone a state change between a non-forest and a forest state (NF→SF) that sample is flagged as "secondary regrowth".

$$a_{j,m} = \frac{A_m}{n_m} \qquad \textbf{EQ 9}$$

Where:

$a_{j,m}$ = Representative sample area for land use subcategory / stratum converted to another Land Use subcategory / stratum (transition denoted by j) stratum m, ha/sample.

A_m = Area of stratum m, ha.

n_m = Number of samples per stratum

$$S_j = \sum_{i \in J} \left(a_{j,m_i} \right) \quad \textbf{EQ 10}$$

Where:

J = Number of samples ofLand Use subcategory / stratum converted to another Land Use subcategory / stratum (transition denoted by j)

S_j = Area of Land Use subcategory / stratum converted to another Land Use subcategory / stratum (transition denoted by j), ha.

$$\Delta \boldsymbol{A_j} = S_j / y \quad \textbf{EQ 11}$$

Where:

$\Delta \boldsymbol{A_j}$ = Area of Land Use subcategory / stratum converted to another Land Use subcategory / stratum (transition denoted by j) in a certain year, ha yr-1.

$\boldsymbol{y}$ = Number of years in the period of analysis. This is equal to 10 years in the ER program.

Results

Following the methodology explained above, Table 23 provides areal results for activity data. As explained below in the section summarizing historical annual emissions, an accuracy assessment was performed on the activity data model. The results from the accuracy assessment were used to adjust activity data areal results. Table 23 is a summary of these adjusted activity data.

Table 23: Adjusted Activity Data - Areal results per regional stratum

Regional Stratum	Deforestation from primary forest (ha/year)	Deforestation from secondary forest (ha/year)	Forest Degradation (ha/year)	ECS -new forests (ha/year)	ECS -existing forests (ha/year)
MIX	5,668	11,479	16,750	3,904	1,121
NFC	900	1,824	2,661	620	178
NFE	2,726	5,521	8,056	1,878	539
PFC	1,499	3,036	4,431	1,033	296
PFE	5,401	10,937	15,960	3,720	1,068
SEC	5,644	11,430	16,679	3,887	1,116
TOTAL	**21,838**	**44,226**	**64,536**	**15,040**	**4,318**

Description of activity data parameters

Description of the parameter	**Primary Deforestation (ΔA_j in EQ 5)** Applicable to all transitions from Primary Forest to Non-Forest during the reference period (2004-2014)
Explanation for which sources or sinks the parameter is used:	Deforestation
Data unit (e.g. ha/yr):	ha/yr
Value for the parameter:	21,838 (Adjusted)
Source of data:	Data source is samples systematically overlaid on historical remote sensing imagery. Imagery is collected for 10 Landsat tiles cover the Mai Ndombe ER Program area for the years 2004, 2006, 2008, 2010, 2012 and 2014. Landsat 7 ETM+ and Landsat 8 OLI images are used. Imagery is mosaicked and color-corrected (see Annex above).
Spatial level (local, regional, national or international):	Local imagery covers the entire ER Program area (10 Landsat tiles) for the 6 epochs in the historical reference period (2004, 2006, 2008, 2010, 2012 and 2014). Imagery spatial resolution is medium (30m x 30m pixels).
Discussion of key uncertainties for this parameter:	Uncertainty stems primarily from errors made in manual classification of Landsat imagery resulting in incorrect land cover change labels.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	26.2% relative uncertainty at 90% confidence level based on an accuracy assessment (see section 12).

Description of the parameter	**Secondary deforestation (ΔA_j in EQ 5)** Applicable to all transitions from Secondary Forest (SF) to Non-Forest (NF) during the reference period (2004-2014)
Explanation for which sources or sinks the parameter is used:	Deforestation
Data unit (e.g. ha/yr):	ha/yr
Value for the parameter:	44,226 (Adjusted)
Source of data:	Data source is samples systematically overlaid on historical remote sensing imagery. Imagery is collected for 10 Landsat tiles cover the Mai Ndombe ER Program area for the years 2004, 2006, 2008, 2010, 2012

	and 2014. Landsat 7 ETM+ and Landsat 8 OLI images are used. Imagery is mosaicked and color-corrected (see Annex).
Spatial level (local, regional, national or international):	Local imagery covers the entire ER Program area (10 Landsat tiles) for the 6 epochs in the historical reference period (2004, 2006, 2008, 2010, 2012 and 2014). Imagery spatial resolution is medium (30m x 30m pixels).
Discussion of key uncertainties for this parameter:	Uncertainty stems primarily from errors made in manual classification of Landsat imagery resulting in incorrect land cover change labels.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	18.5% relative uncertainty at 90% confidence level based on an accuracy assessment (see Section 12).

Description of the parameter	**Degradation (ΔA_j inEQ 8)** Applicable to all transitions from Primary forest (PF) to Secondary Forest (SF) during the reference period (2004-2014)
Explanation for which sources or sinks the parameter is used:	Forest Degradation
Data unit (e.g. ha/yr):	ha/yr
Value for the parameter:	64,536 (Adjusted)
Source of data:	Data source is samples systematically overlaid on historical remote sensing imagery. Imagery is collected for 10 Landsat tiles cover the Mai Ndombe ER Program area for the years 2004, 2006, 2008, 2010, 2012 and 2014. Landsat 7 ETM+ and Landsat 8 OLI images are used. Imagery is mosaicked and color-corrected (see Annex).
Spatial level (local, regional, national or international):	Local imagery covers the entire ER Program area (10 Landsat tiles) for the 6 epochs in the historical reference period (2004, 2006, 2008, 2010, 2012 and 2014). Imagery spatial resolution is medium (30m x 30m pixels).
Discussion of key uncertainties for this parameter:	Uncertainty stems primarily from errors made in manual classification of Landsat imagery resulting in incorrect land cover change labels.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	17.4% relative uncertainty at 90% confidence level based on an accuracy assessment (see Section 12).

Description of the parameter	**Regrowth (ΔA_j inEQ 8)** Applicable to all transitions from Secondary Forest (SF) to Primary forest (PF) during the reference period (2004-2014)
Explanation for which sources or sinks the parameter is used:	Enhancement of forest carbon stocks (in existing forests)
Data unit (e.g. ha/yr):	ha/yr
Value for the parameter:	4,318 (Adjusted)
Source of data:	Data source is samples systematically overlaid on historical remote sensing imagery. Imagery is collected for 10 Landsat tiles cover the Mai Ndombe ER Program area for the years 2004, 2006, 2008, 2010, 2012 and 2014. Landsat 7 ETM+ and Landsat 8 OLI images are used. Imagery is mosaicked and color-corrected (see Annex).
Spatial level (local, regional, national or international):	Local imagery covers the entire ER Program area (10 Landsat tiles) for the 6 epochs in the historical reference period (2004, 2006, 2008, 2010, 2012 and 2014). Imagery spatial resolution is medium (30m x 30m pixels).
Discussion of key uncertainties for this parameter:	Uncertainty stems primarily from errors made in manual classification of Landsat imagery resulting in incorrect landcover change labels.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	70.0% relative uncertainty at 90% confidence level based on an accuracy assessment (see Section 12).

Description of the parameter	**Secondary regrowth (ΔA_j in EQ 5)** Applicable to all transitions from Non-Forest (NF) to Secondary Forest (SF) during the reference period (2004-2014)
Explanation for which sources or sinks the parameter is used:	Enhancement of forest carbon stocks (in new forests)
Data unit (e.g. ha/yr):	ha/yr
Value for the parameter:	15,040 (Adjusted)
Source of data:	Data source is samples systematically overlaid on historical remote sensing imagery. Imagery is collected for 10 Landsat tiles cover the Mai Ndombe ER Program area for the years 2004, 2006, 2008, 2010, 2012 and 2014. Landsat 7 ETM+ and Landsat 8 OLI images are used. Imagery is mosaicked and color-corrected (see Annex).

Spatial level (local, regional, national or international):	Local imagery covers the entire ER Program area (10 Landsat tiles) for the 6 epochs in the historical reference period (2004, 2006, 2008, 2010, 2012 and 2014). Imagery spatial resolution is medium (30m x 30m pixels).
Discussion of key uncertainties for this parameter:	Uncertainty stems primarily from errors made in manual classification of Landsat imagery.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	32.5% relative uncertainty at 90% confidence level based on an accuracy assessment (see Section 12).

EMISSION FACTORS USED FOR CALCULATING THE AVERAGE ANNUAL HISTORICAL EMISSIONS OVER THE REFERENCE PERIOD

Methodology to determine emission factors

Carbon stock data were developed under the Carbon Map and Model program, by a Light Detection and Ranging (LIDAR) flight campaign in the ER program area (LIDAR flights were conducted from June 2014 to October 2014). This program is funded by the International Climate Initiative of the International Climate Initiative of The German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and implemented by the WWF and the University of California and supports REDD+ processes in DRC inter alia through the development of a national forest carbon stock map (see map Annex 19). At the time of writing, The biomass map for Mai Ndombe has been validated by DIAF and it has been confirmed its use. For the calculation of biomass in the accounted carbon pools and subsequently emission factors, the ER-Program is using the latest version of the biomass map. Carbon stock estimates and consequently emission factors were calculated based on this biomass map using the following approach:

1. Both the biomass map (AGB) as well as the uncertainty map (AGB) and the land cover map (all from Saatchi et al. 2016) were overlaid with the sample point classification (all strata and epochs) using ArcGIS
2. Then, biomass values were extracted from the raster files (biomass maps, uncertainty map, land cover map) to the sample point shape file. The resulting attribute table of the sample point shapefile shows for every sample point a) the ER-Program land cover classification, the AGB estimate, the uncertainty related to the AGB estimate and the land cover classification from Saatchi et al. (2016)
3. Further, to reduce the influence of the land cover classification errors in the AGB estimate, only samples fulfilling the following two conditions were used to extract data from the biomass map:
    a. Samples that were stable over the entire reference period, and
    b. Samples that were at least consistently classified at 3 points in time during the reference period

See **Error! Reference source not found.** below for some examples.

Figure 10: Selection procedure for samples to extract biomass data

2004	2006	2008	2010	2012	2014	Result	
DF	Cloud	Cloud	DF	DF	DF	Yes	Selected for DF
DF	Cloud	SF	DF	DF	DF	No	Rejected because "unstable" sample
SF	Cloud	Cloud	Cloud	Cloud	SF	No	Rejected because only 2 consistent observations

4. The attribute table was exported for processing in MS Excel. Prior to calculating the average biomass estimates for the different ER-Program land cover classes, these classes were compared to the land cover classes from Saatchi et al. (2015).
5. Given the fact that biomass is not evenly distributed across the ER-Program area it was decided to calculate stratified biomass estimates and emission factors. For stratification, the strata for placing sample points to measure activity data were used.

Table 24: Differences in AGB by stratum in the ER-Program area

Stratum	Land cover class	mean AGB [tdm/ha]
MIX	**Dense Forest**	261.41
NFC		279.45
NFE		273.48
PFC		334.04
PFE		303.38
SEC		289.57
MIX	**Secondary Forest**	103.48
NFC		198.79
NFE		163.94
PFC		315.76
PFE		164.68
SEC		125.23
MIX	**Non-Forest**	15.35
NFC		57.83
NFE		14.52
PFC		34.00
PFE		39.15
SEC		25.69

6. Using the filtered samples, the mean above-ground biomass (AGB) by ER-Program land cover class and stratum was calculated (see **Error! Reference source not found.** above).

7. Below-ground biomass (BGB) was then calculated by applying root-shoot ratios (RSR) to each pixel of the biomass map and then calculating the mean BGB for each stratum for each land cover class.
8. A stratified biomass estimator was then calculated by multiplying the stratum-specific biomass estimate (AGB and BGB) for any land cover class with the areal proportion of each stratum and adding them up.

The calculated total biomass and emission and removal factors can be found in Table 25**Error! Reference source not found.** and Table 26 **Error! Reference source not found.** below.

Table 25: Mean AGB and BGB by stratum & stratified biomass estimator for each LC class

Stratum	Land cover class	mean AGB [tdm/ha]	mean BGB [tdm/ha]	areal proportion [%]	Stratified biomass estimator (AGB+BGB) [tdm/ha]
MIX	**Dense Forest**	261.41	61.33	6.0%	**376.88**
NFC		279.45	65.7	8.2%	
NFE		273.48	64.2	15.4%	
PFC		334.04	78.5	37.6%	
PFE		303.38	71.3	28.0%	
SEC		289.57	68.0	4.7%	
MIX	**Secondary Forest**	103.48	22.9	34.4%	**192.9**
NFC		198.79	46.1	1.9%	
NFE		163.94	37.8	11.1%	
PFC		315.76	74.1	13.4%	
PFE		164.68	37.7	20.4%	
SEC		125.23	28.0	18.8%	
MIX	**Non-Forest**	15.35	6.1	66.7%	**25.2**
NFC		57.83	23.1	1.6%	
NFE		14.52	5.8	18.5%	
PFC		34.00	13.6	0.1%	
PFE		39.15	15.7	5.9%	
SEC		25.69	10.3	7.2%	

Table 26: Stratified emission and removal factors

Sources & Sinks	Stratified emission / removal factor	Unit
Deforestation (PN)	605.98	tCO2/ha
Secondary deforestation (SN)	288.88	tCO2/ha
Degradation (PS)	317.1	tCO2/ha
Primary regrowth (Y)	-15.9	tCO2/ha/year
Secondary regrowth (X)	-14.4	tCO2/ha/year

Based on the stratified emission and removal factors presented in Table 25**Error! Reference source not found.**, emission and removal factors for each of the REL transition profiles used in the activity data model are provided in Table 27**Error! Reference source not found.** below.

Table 27: Emission and removal factors for all REL transition types

REL transition profiles	Emission & removal factor [tCO2/ha]
PN	605.98
PNX	577.09
PNXX	548.20
PNXXX	519.31
PNXXXX	490.42
PS	317.09
PSY	285.38
PSYY	253.68
PSYYY	221.97
PSYYYY	190.26
SN	288.88
SNX	259.99
SNXX	231.11
SNXXX	202.22
SNXXXX	173.33
SY	-31.71
SYY	-63.42
SYYY	-95.13
SYYYY	-126.84
SYYYYY	-158.55
NX	-28.89
NXX	-57.78
NXXX	-86.66
NXXXX	-115.55
NXXXXX	-144.44

Table 28 below lists the root-shoot ratios and carbon fraction values used for the calculation of the emission factors.

Table 28: Root-shoot ratios and default values used for the determination of emission factors

Parameter	Value	Source
Carbon fraction of AG forest biomass [tC/t]	0.47	IPCC AFOLU guidelines 2006, table 4.3 (McGroddy et al. 2004)
Root-shoot ratio: forest > 125 tC/ha	0.235	IPCC AFOLU guidelines 2006, table 4.4 (Monkany et al. 2006)
Root-shoot ratio: forest < 125 tC/ha	0.205	IPCC AFOLU guidelines 2006, table 4.4 (Monkany et al. 2006)

Root-shoot ratio: savannah/shrubland	0.40	IPCC AFOLU guidelines 2006, table 4.4 (Poupon 1980)

Description of Emission and Removal factor parameters

Stratified general emission and removal factors

Description of the parameter including the forest class if applicable:	**Deforestation emission factor (EF_{DEF} in EQ 5)** It accounts for the difference in carbon stocks between primary forest (PF) and Non-Forest (NF) and the post-deforestation regrowth.
Data unit (e.g. t CO_2/ha):	tCO2/ha
Value for the parameter:	<table><tr><th>LC Class</th><th>Emission factor (tCO2/ha)</th></tr><tr><td>**PN**</td><td>605.98</td></tr><tr><td>**PNX**</td><td>577.09</td></tr><tr><td>**PNXX**</td><td>548.20</td></tr><tr><td>**PNXXX**</td><td>519.31</td></tr><tr><td>**PNXXXX**</td><td>490.42</td></tr></table>*X represents a 2-year regrowth from non-forest to secondary forest.
Source of data:	PROJECT "CARBON MAP AND MODEL (CM&M)". S. Saatchi, V. Meyer, A. Xu, A. Ferraz, Y. Yan, A. Fricker. Institute of the Environment and Sustainability, University of California, Los Angeles. 2015.
Spatial level (local, regional, national or international):	Local / Regional (Mai Ndombe Province)
Discussion of key uncertainties for this parameter:	• Ground biomass error • Lidar height measurement error • Lidar height to biomass model • Sampling error • ME prediction errors from the Maximum Entropy model See Saatchi et al. 2015 for details
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Confidence interval at the 90% confidence level <table><tr><th>LC Class</th><th>CI</th></tr><tr><td>**PN**</td><td>+/-93.93</td></tr><tr><td>**PNX**</td><td>+/-94.21</td></tr><tr><td>**PNXX**</td><td>+/-95.05</td></tr><tr><td>**PNXXX**</td><td>+/-96.43</td></tr></table>

	PNXXXX +/-98.32 Source: IPCC 2006 Vol.1, Chap. 3; Equation 3.1 - "Combining Uncertainties"

Description of the parameter including the forest class if applicable:	**Secondary deforestation emission factor, (EF_{SDEF} in EQ 5)** It accounts for the difference in carbon stocks between secondary forest (SF) and Non-Forest (NF).
Data unit (e.g. t CO_2/ha):	tCO2/ha
Value for the parameter:	LC Class / Emission factor (tCO2/ha) **SN** 288.88 **SNX** 259.99 **SNXX** 231.11 **SNXXX** 202.22 **SNXXXX** 173.33 *X represents a 2-year regrowth from non-forest to secondary forest
Source of data:	PROJECT "CARBON MAP AND MODEL (CM&M)". S. Saatchi, V. Meyer, A. Xu, A. Ferraz, Y. Yan, A. Fricker. Institute of the Environment and Sustainability, University of California, Los Angeles. 2015.
Spatial level (local, regional, national or international):	Local / Regional (Mai Ndombe Province)
Discussion of key uncertainties for this parameter:	• Ground biomass error • Lidar height measurement error • Lidar height to biomass model • Sampling error • ME prediction errors from the Maximum Entropy model See Saatchi et al. 2015 for details
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Confidence interval at the 90% confidence level: LC Class / CI **SN** +/-72.64 **SNX** +/-73.00 **SNXX** +/-74.08 **SNXXX** +/-75.84

	SNXXXX +/-78.24 Source: IPCC 2006 Vol.1, Chap. 3; Equation 3.1 - "Combining Uncertainties"

Description of the parameter including the forest class if applicable:	**Degradation emission factor (EF_{DEG} in EQ 8)** It accounts for the difference in carbon stocks between primary forest (PF) and secondary forest (SF)
Data unit (e.g. t CO_2/ha):	tCO2/ha
Value for the parameter:	LC Class / Emission factor (tCO2/ha) **PS** 317.09 **PSY** 285.38 **PSYY** 253.68 **PSYYY** 221.97 **PSYYYY** 190.26 *Y represents a 2-year regrowth from secondary forest to primary forest
Source of data:	PROJECT "CARBON MAP AND MODEL (CM&M)". S. Saatchi, V. Meyer, A. Xu, A. Ferraz, Y. Yan, A. Fricker. Institute of the Environment and Sustainability, University of California, Los Angeles. 2015.
Spatial level (local, regional, national or international):	Local / Regional (Mai Ndombe Province)
Discussion of key uncertainties for this parameter:	• Ground biomass error • Lidar height measurement error • Lidar height to biomass model • Sampling error • ME prediction errors from the Maximum Entropy model See Saatchi et al. 2015 for details
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Confidence interval at the 90% confidence level: LC Class / CI **PS** +/-117.33 **PSY** +/-117.91 **PSYY** +/-119.65 **PSYYY** +/-122.49 **PSYYYY** +/-126.36

	Source: IPCC 2006 Vol.1, Chap. 3; Equation 3.1 - "Combining Uncertainties"

Description of the parameter including the forest class if applicable:	**Regrowth removal factor (RF_{REG} in EQ 5)** It accounts for the difference in carbon stocks between secondary forest (SF) and primary forest (PF). This parameter is the inverse emission factor for Degradation. However, in accordance with the 2006 IPCC guidelines, a default transition period of 20 years is assumed for a secondary forest to revert to primary forest. When compared to the annual increment value (IPCC default value) for forests of this type and age, this assumption is conservative, as it overestimates removals and thus underestimates emissions.
Data unit (e.g. t CO_2/ha):	tCO2/ha/year
Value for the parameter:	LC Class / Emission factor (tCO2/ha) **SY** -31.71 **SYY** -63.42 **SYYY** -95.13 **SYYYY** -126.84 **SYYYYY** -158.55 *Y represents a 2-year regrowth from secondary forest to primary forest
Source of data:	PROJECT "CARBON MAP AND MODEL (CM&M)". S. Saatchi, V. Meyer, A. Xu, A. Ferraz, Y. Yan, A. Fricker. Institute of the Environment and Sustainability, University of California, Los Angeles. 2015.
Spatial level (local, regional, national or international):	Local / Regional (Mai Ndombe Province)
Discussion of key uncertainties for this parameter:	• Ground biomass error • Lidar height measurement error • Lidar height to biomass model • Sampling error • ME prediction errors from the Maximum Entropy model See Saatchi et al. 2015 for details

Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Confidence interval at the 90% confidence level: LC Class / CI **SY** +/-11.73 **SYY** +/-23.47 **SYYY** +/-35.20 **SYYYY** +/-46.93 **SYYYYY** +/-58.66 Source: IPCC 2006 Vol.1, Chap. 3; Equation 3.1 - "Combining Uncertainties"

Description of the parameter including the forest class if applicable:	**Secondary regrowth removal factor, (RF_{SREG} in EQ 8)** It accounts for the difference in carbon stocks between non-forest (NF) and secondary forest (SF). This parameter is the inverse emission factor for secondary deforestation. However, in accordance with the 2006 IPCC guidelines, a default transition period of 20 years is assumed for a secondary forest to revert to primary forest. When compared to the annual increment value (IPCC default value) for forests of this type and age, this assumption is conservative, as it overestimates removals and thus underestimates emissions.
Data unit (e.g. t CO_2/ha):	tCO2/ha/year
Value for the parameter:	LC Class / Emission factor (tCO2/ha) **NX** -28.89 **NXX** -57.78 **NXXX** -86.66 **NXXXX** -115.55 **NXXXXX** -144.44
Source of data:	PROJECT "CARBON MAP AND MODEL (CM&M)". S. Saatchi, V. Meyer, A. Xu, A. Ferraz, Y. Yan, A. Fricker. Institute of the Environment and Sustainability, University of California, Los Angeles. 2015.
Spatial level (local, regional, national or international):	Local / Regional (Mai Ndombe Province)
Discussion of key uncertainties for this parameter:	• Ground biomass error

	• Lidar height measurement error • Lidar height to biomass model • Sampling error • ME prediction errors from the Maximum Entropy model See Saatchi et al. 2015 for details
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	Confidence interval at the 90% confidence level: LC Class / CI **NX** +/-7.26 **NXX** +/-14.53 **NXXX** +/-21.79 **NXXXX** +/-29.06 **NXXXXX** +/-36.32 Source: IPCC 2006 Vol.1, Chap. 3; Equation 3.1 - "Combining Uncertainties"

CALCULATION OF THE AVERAGE ANNUAL HISTORICAL EMISSIONS OVER THE REFERENCE PERIOD

The average annual historical emissions over the reference period have been estimated using all the equations set in Chapter 8.3.1. Activity data is multiplied by Emission Factors and Removals factors to estimate emissions from deforestation and degradation, and removals from enhancement of carbon stocks in either new forests or existing forests.

A summary of annual historical emissions is reported in **Error! Reference source not found.** below.

- Emissions from deforestation amount to 24.8 Million tCO_2e/yr and degradation to 19.03 Million tCO2/yr.
- Enhancement of carbon stocks is 1.4 million tCO_2e /yr
- The total emissions from deforestation and forest degradation for all land use classes are calculated at **42.4 Million tCO_2e/yr.**

Table 29: Annual historical emissions over the reference period

Stratum	Deforestation (tCO_2e/yr)		Degradation (tCO_2e/yr)	Enhancement of carbon stocks (tCO_2e /yr)		Total Emissions (tCO_2e /yr)
	Primary forest	Secondary forest		New forests	Existing forests	
MIX	2,317,768	5,116,880	2,717,836	(322,422)	(28,055)	9,802,007
NFC	203,672	183,206	640,302	(29,038)	(7,589)	990,553
NFE	969,706	1,200,827	1,549,934	(86,017)	(22,870)	3,611,582

PFC	3,675,681	928,423	7,306,883	(387,882)	(114,692)	11,408,412
PFE	4,984,729	2,952,553	5,570,762	(188,697)	(120,655)	13,198,690
SEC	600,047	1,679,867	1,245,045	(110,119)	(15,079)	3,399,761
TOTAL	12,751,603	12,061,756	19,030,762	(1,124,176)	(308,940)	42,411,005

8.4 UPWARD OR DOWNWARD ADJUSTMENTS TO THE AVERAGE ANNUAL HISTORICAL EMISSIONS OVER THE REFERENCE PERIOD

The following section discusses the ER Program's eligibility for an upward adjustment and provides the justification and quantification for the adjustment.

EXPLANATION AND JUSTIFICATION OF PROPOSED UPWARD ADJUSTMENT

FCPF eligibility requirements

The Carbon Fund Methodological Framework states that a Reference Level shall not exceed the average historical emissions over the Reference period, unless the ER Program can demonstrate that the following eligibility requirements can be met:

i. long-term historical deforestation has been minimal across the entirety of the country, and the country has high forest cover;
ii. national circumstances have changed such that rates of deforestation and forest degradation during the historical Reference Period likely underestimate future rates of deforestation and forest degradation during the period of the ERPA.

Per the DRC's forest cover change detection map for the period 1990-2010, prepared in 2015 by the DIAF with the support of FAO, the country had a forest cover of approximately 152 million hectares in 2010. According to the World Bank (2015), DRC's land is 226.7 million hectares, i.e. the forest cover amounts to 67%. Accordingly, DRC's forest cover ratio ranks 19th out of 248 countries. At the same time, DRC's annual deforestation rate has been approximately 0.30% between 1990 and 2010. The DRC is therefore classified as a country with high forest cover and low historic deforestation (HFLD) looking at the entirety of the country.

Based on the Reference Emission Level over the historic reference period, net GHG emissions increased in the program area from 46.5 million tCO2e in 2004 up to 79.2 million tCO2e in 2014. This makes the Mai Ndombe province a hot spot of deforestation and forest degradation in the country and justifies its selection as location of DRC's REDD+ pilot program.

Because the DRC has been in a post-conflict situation during the historic reference period, it is assumed that the observed increase in emissions is the combined result of an improving economy, increasing political stability and changing demography. These development trends are expected to continue. Therefore, it is not expected that the high emission levels experienced towards the end of the reference period would significantly decrease in the future. These trends are likely to lead to an influx of investment into the country, increase of available capital, improved infrastructure and therefore improved access to markets.

Being a hot spot area within an HFLD characterized country, together with evidence of changes in national circumstances, qualifies the ER program to be eligible for an upward adjustment. Key parameters for the justification of the adjustment are discussed in subsequent sections below.

Justification for an adjustment in the Mai Ndombe ER Program

DRC was in a post-conflict situation during the historic reference period. The Great African War, also referred to as the second Congo War, started in August, 1998 and ended with a peace treaty signed in July, 2003. The war involved a wide range of paramilitary groups as well as up to nine countries, with DRC being the main area of conflict. Even after the signature of the peace treaty, some groups remained active,

causing turmoil and great harm to the population, as well as hampering DRC's economic development. Because Mai Ndombe supplies important goods to Kinshasa, the provincial economy was negatively affected. It is therefore important to note that the start of the historic reference period is in a post conflict phase. Consequently, all parameters investigated are generally increasing, with demography (population growth) and economic development (economic growth) being the most significant. The development trends of these parameters and their links to deforestation are discussed below.

Population Growth

There is a range of datasets evaluating DRC's population development. Some of them report at the provincial level, others at the national level, which can then be broken down to population estimates for the Mai Ndombe Province. These reports include:

- FAO population data reported at the national level including projected population[51],
- UNDP population broken down by province and estimated for 1994 and 1998[52],
- Population data reported by the DRC Ministry of Public Health for 2010 to 2015 by province[53],
- Population data reported by de Saint Moulin (2006),
- Population counts reported by M. Rodriguez et al. (2015) and Bénéficier du Dividende Démographique (Gengnant et al., 2014).

For both FAO and the Ministry of Health studies, population increases were 2.75% per year. FAO reports this as the national average, while the Ministry of Health disaggregates the number across provinces[54]. However, each province has the same growth rate of 2.75%, indicating that the FAO reported growth rate has probably been distributed evenly across the provinces. The UNDP number shows varying population growth numbers for different provinces, but when averaged across the country the population growth at national level is zero calling into question this dataset. Finally, the average annual population growth rate provided by Leon de Saint Moulin is about 3%. Population estimates for health zones using this growth rate are generally consistent with the ones obtained from applying the 3% growth rate to the 1984 population census data. Furthermore, population estimates provided by the Ministry of Interior for the year 2014 in the context of the BioCf*plus* study in the Mai Ndombe Province are sometimes double the population counts obtained from applying the 3% growth rate to the 1984 population census data. Gugnant et al. estimate the growth per year at 2.6% in the Mai Ndombe area based on an analysis of data from the de Saint Moulin study and figures from the Ministry of Health and the U.N. with a national average rate of 3.2% between 1984-2010.

Considering that the last census was conducted in 1984 and ever since all population data has been based on estimates or projections, there exists some uncertainty regarding the actual population size and its annual growth. However, there is a consensus among various existing studies that population growth is significant with estimated increases ranging from 2.6% to 3.2% per annum.

[51]http://faostat3.fao.org/download/O/OA/E

[52]http://www.cd.undp.org

[53]http://drcongo.opendataforafrica.org/ayyfgdd/population-distribution-by-province-of-the-drc-2010

[54] The report by Rodriguez et al. (2015) also used Ministry of Health data, but they appear to have obtained for Mai Ndombe.

If one looks at the following results of two studies in the districts of Plateau and Mai-Ndombe (the latter involving 400 households alone), the link between population growth and deforestation becomes clear: The average household uses an area of 1 hectare for farming, applying a fallow-slash and burn system on forest land, whereas savanna lands are only marginally cultivated or not at all. This system requires an area of 5 hectares per household based on a 5-year rotation. With an annual population growth rate of 3%, every year means an additional 6,500 agricultural households, each needing 5 hectares of primary forest (or mature secondary forest) to achieve a stable agricultural production system, equivalent to 32,500 hectares per year.

These findings provide evidence that population growth contributes to increasing deforestation rates in Mai Ndombe and that future deforestation rates are likely to raise because of a growing population. Assuming specific land consumption (i.e. ha/capita) remains constant, population growth is extremely likely to lead to a further increase of deforestation and forest degradation.

Economic Development

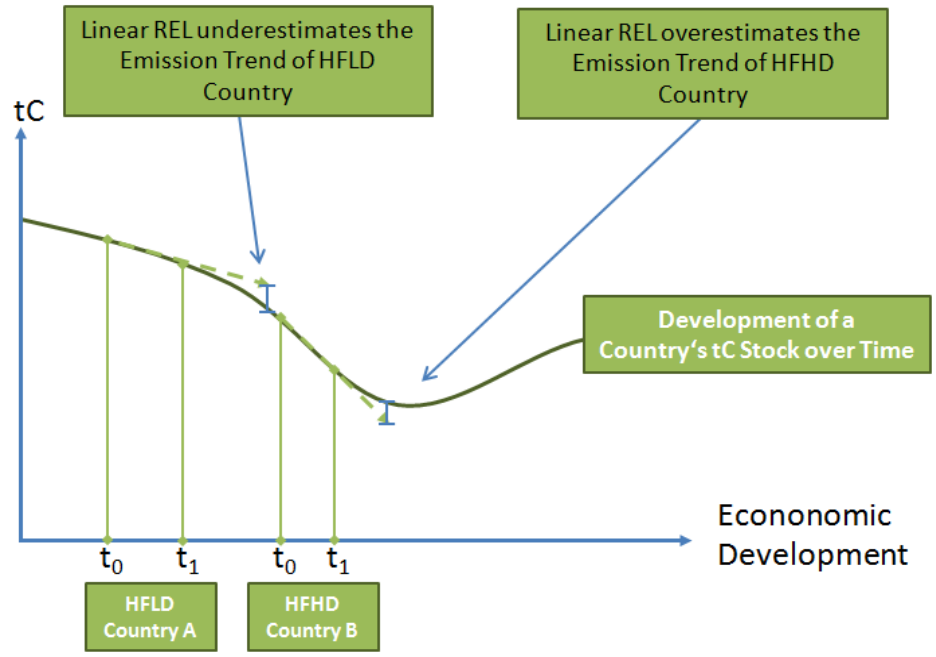
Ferretti-Gallon and Busch (2014) reviewed 117 spatially explicit econometric studies of deforestation and concluded that forests are exposed to higher risks to be cleared where economic returns to agriculture and pasture are high. Their meta-study provides two key conclusions:

- Economic returns and related profits from production are depending on access to markets.
- Poverty is highly correlated with lower rates of deforestation, and therefore improved economy is correlated with increasing rates of deforestation.

Following the forest transition curve theory, this may hold true especially for HFLD countries (cp. Fonseca et al., 2007). That means as these countries improve their economic wellbeing, the environmental footprint of production increases in terms of a decrease of forest carbon stocks (see figure below).

The DRC has one of the highest agricultural production potentials in Africa. At the same time, DRC's access to markets is one of the poorest (Ulimwengu et al., 2009):Today, the country's road network is estimated at 24,000 km whereas it was 60,000 km in the 1960s. DRC's poverty and poor access to markets are prevalent also in Mai Ndombe, which has limited large-scale development of agriculture, pasture and mining (Dorosh et al., 2010; DRC, In Press; Ulimwengu et al., 2009; Wilkie et al., 2000). Over the historic reference period, the Program area experienced an increase of agricultural productivity at smallholder level fueled by an increase of demand from EU funded road infrastructure measures (mainly road rehabilitation and establishment of one new road).

Figure 11: REL Establishment and Forest Transition Theory



Along with agriculture, fuelwood is a second source of smallholder income. Demand is increasing due to population growth and lack of alternative energy sources. While the demand for fuelwood does not originate in Mai Ndombe itself, it is high for the ever growing capital of Kinshasa where fuelwood (mainly charcoal) is the primary source of energy (Schure et al., 2010). It is estimated that around 24% of Kinshasa's fuelwood demand is supplied from the Mai Ndombe province (*ibid*).

To account for these circumstances, several economic factors were assessed as explanatory variables for adjusting the average historical reference level, namely Gross Domestic Product (GDP), agricultural production index, and the price of agricultural commodities. The GDP and agricultural production index are reported nationally for 2003 to 2013 by the Central Bank of Congo.[55]DRC's GDP has steadily risen since 2003 at a rate of 16.8% per year. The agricultural production index, which is the volume of production compared to a base year (i.e. year 2000) also rose steadily between 2003 and 2013 at a rate of 2.8%.

Commodity prices for the primary agricultural products were also evaluated. However, only limited data was available. The primary crops in the program area are cassava, maize, rice, peanut, beans, plantains sweet potato, and potato (see Table 30).

Cassava dominates the market in DRC and Mai Ndombe province is the biggest producer in DRC with an estimated 22% of the total production (Humpal, et al., 2012; table 2). Data from Humpal, et al. (2012) suggest that over the period 2000-2006 production has remained relatively constant for both DRC and Bandundu and experienced growth ever since.

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[55]http://drcongo.opendataforafrica.org/bpkbqw/main-macroeconomic-indicators-of-the-drc-2012

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Table 30: **Agricultural Production in Mai-Ndombe in 2005**

Crop	Green weight (in t)
Cassava	5,158,950
Maize	234,919
Rice	68,571
Plantain	62,287
Sweet potato	54,395
Millet	49,385
Potato	3,701
Peanut	623
MONOGRAPHIE DE LA PROVINCE DU BANDUNDU, 2005	

Conclusions

This Section summarizes the two parameters discussed above. Figure 10 below presents the development of the population (rural and economic) in the Main Ndombe province, contrasted with the development of GDP and agricultural and livestock indicators at national level. All data was normalized to 100% for the base year of the historic reference period (i.e. 2004) and covers the period up to 2014.

The assessment demonstrates an increase of all parameters over the reference period. Moreover, increase of livestock is above the increase of agricultural production, which indicates a substitution effect of agricultural products by meat related to higher income levels. Finally, it is important to note that all these trends correlate with the increase of deforestation over the same period in the program area. This supports the argument that population growth and improving economic- and agricultural development lead to increasing deforestation.

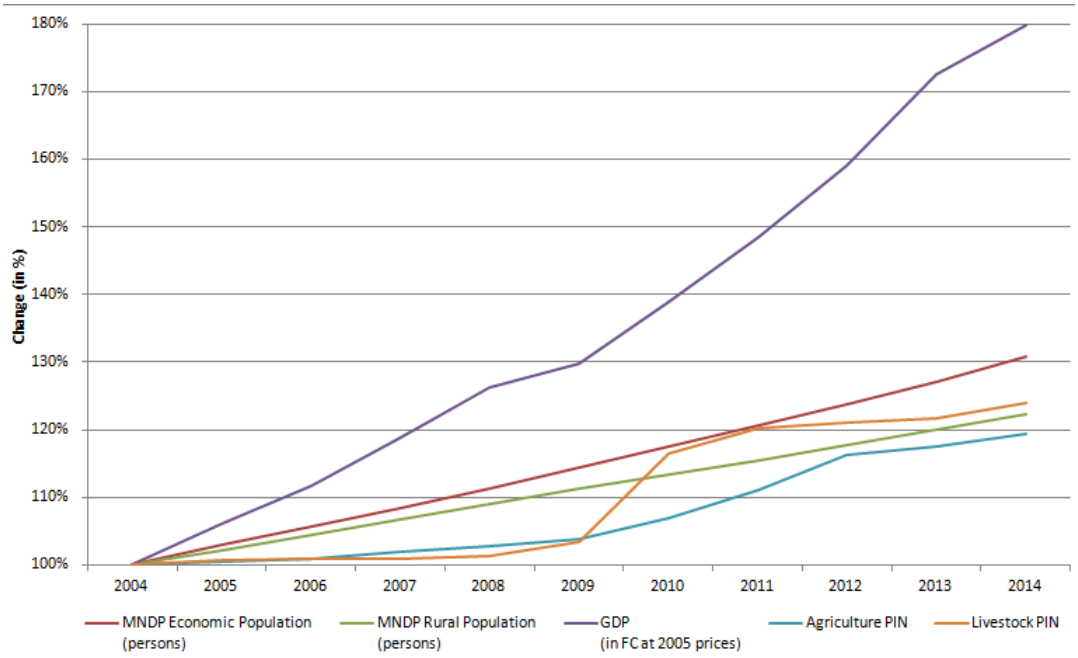


Figure 12: Evolution of GDP, population and agricultural parameters over the reference period

These accentuated trends are consistent with the results other studies such as Zarin et al. (2016) for the whole DRC. Although the study from Zarin refers to gross deforestation of primary forest (i.e. it does not consider degradation and deforestation of secondary forest), it shows a very steep trend in GHG emissions from deforestation of primary forest.

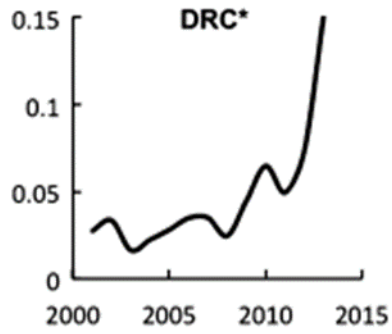


Figure 13. Annual carbon GHG emissions from gross deforestation (GtCO2/year) per Zarin et al. (2016). [56]

In view of this, based on this documented evidence, it can be concluded that there is a very steep change in ER Program circumstances that are not fully reflected in the average annual historical emissions during the Reference period. Although this acceleration of trends would be partially covered in the reference period, the rate is so steep that the average annual historical emissions would be biased with regard to future expected emissions. Hence, following Indicator 13.3 of the Methodological Framework, it would be justified the adjustment of average historical emissions.

[56] Emissions from degradation and deforestation of secondary forest are not considered.

QUANTIFICATION OF THE PROPOSED UPWARD ADJUSTMENT

Determination of the Cap

As specified in the Methodological Framework, the adjustment is limited to 0.1% of total forest carbon stocks in the program area. The calculation is presented in Table 31 below and the total maximum adjustment is consequently determined at 5.611 million tCO2 per annum.[57]

Table 31: Determination of the Maximum Adjustment	
Above Ground Biomass Stocks	
VALUE	**SUM**
Degraded forest	132,750,203
Intact moist forest	1,598,675,630
Non-forest	42,456,913
Old secondary forest	241,588,962
Savanna	15,763,553
Swamp forest	536,884,028
Water	4,577,115
Young secondary forest	57,727,642
Subtotal - AGB Stock (t.d.m.)	**2,630,424,046**
Below Ground Biomass Stocks	
VALUE	**SUM**
	31,017,926
Intact Moist Forest	375,379,312
Degraded Forest	16,982,765
Degraded Forest	55,783,297
Degraded Forest	6,305,421
Young Secondary Forest	125,858,720
Old Secondary Forest	1,830,846
Swamp Forest	12,774,798
Water	31,017,926
Subtotal - BGB Stock (t.d.m.)	**625,933,084**
Determination of the Maximum Adjustment	
Total Biomass Stocks (t.d.m.)	3,256,357,130
Total Carbon Stocks (tCO2)	5,611,788,788

[57] Please note that LiDAR data estimates will be updated leading to an update of this calculation of the maximum adjustment

Meth framework cap [% of total carbon stocks]	0.1%
Max. upward adjustment for the REL of the Mai-Ndombe Emission Reduction Program [tCO2/year]	**5,611,789**

Quantification of the upwards adjustment to the REL

To quantify the adjustment, the REL's GHG emission trend has been assessed. This is based on the results of the sampling approach, i.e. based on analyzing all transition patterns for the different strata discussed above (e.g. Primary Forest Core, Primary Forest Edge) for all six time periods (i.e. 2004-2006 up to 2010-2012) and considers the 'adjusted areas' as determined in Chapter 8.5 below. It is important to note that there are transition patterns that undergo transitions not only during two, but also up to six time periods.[58]The emissions or removals of such transitions are not accounted during one period, but are accounted over all periods that inhibit change. This leads to an overall result that is not highly accurate in terms of the time of emissions occurrence, but that reflects a smoothened emissions trend. This is considered conservative for the determination of the adjustment.[59]

In the program area, the GHG emissions in the 2004-2006 period amount to approx. 30.99 million tCO2e increasing to 53.4 million tCO2e over the 2012-2014 period (see Table 32 below).

As discussed under the section 'justification' above, it is assumed that the future emission levels will not decrease below the level of 2012-2014. A decrease could only be envisaged in the events of A) war or civil turmoil requiring the local population to abandon the area or B) a sudden increase of wealth allowing the local population to produce with high capital intensity and to invest into nature conservation. Both scenarios are considered highly unlikely.

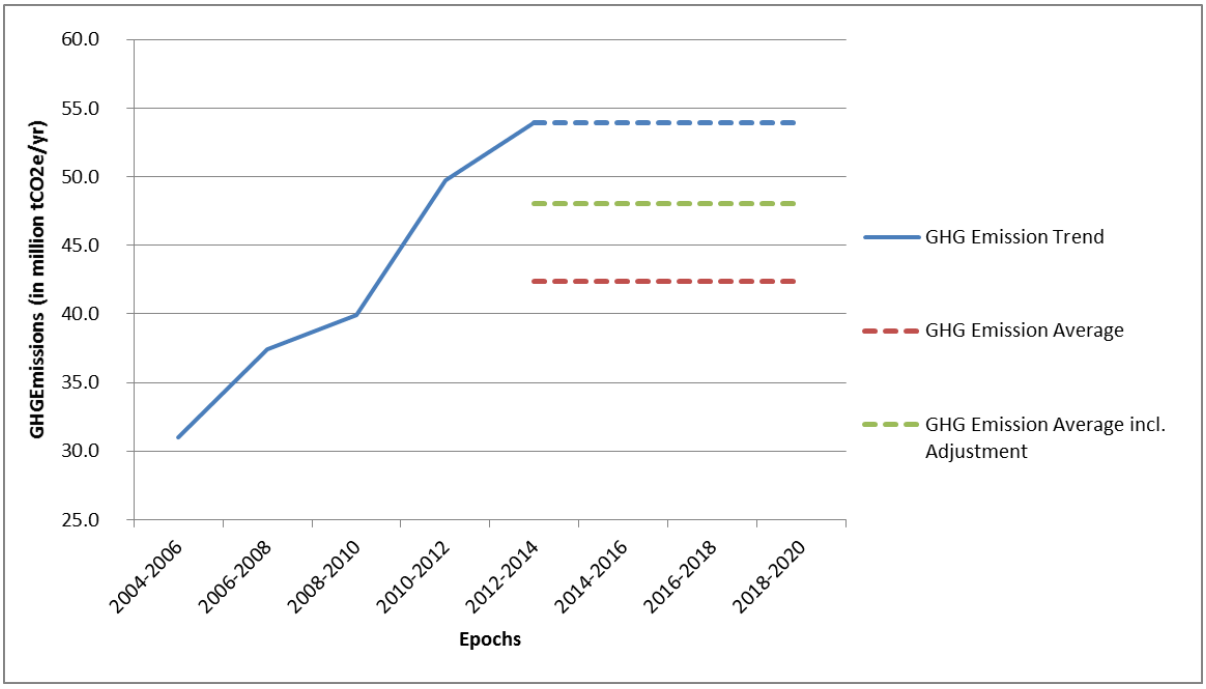
Table 32**: Analysis of the GHG Emission Trend**

GHG Emission Trend	Emissions (tCO2e/yr)
2004-2006	30.99
2006-2008	37.42
2008-2010	39.93
2010-2012	49.77
2012-2014	53.94
GHG Emission Average	**42.41**
GHG Emission Av. Incl. Adjustment	**48.02**

[58]E.g. a sample is classified as secondary forest in the first period (2004-2006), as non-forest in 2006-2008 and thereafter as secondary forest for all three remaining periods. Such a sample is classified as secondary deforestation with 3 periods of regrowth.

[59]The excel file providing the analysis will be provided upon request.

Figure 14: Results of the Adjustment compared to the Adjustment Cap



Considering this historic trend, future emissions seem likely to exceed the 2012-2014 emission level (i.e. 53.94 million tCO2e/yr). If future emissions correspond to those of 2012-14, this means that the historic average emissions (i.e. 42.41 million tCO2e/yr) underestimate future emissions by 21.4% (11.53 million tCO2e/yr). That means the ER Program would have to reduce 11.53 million tons CO2 before it may claim a first emission reduction payment.

Considering this situation based on the evidence of changes in national circumstances, the ER Program is proposed to account for the maximum allowable adjustment of 5.61 million tCO2e/year. This still requires an important effort by DRC to reduce emissions under the adjusted RL and the country's own contributions remains significant, ambitious and challenging.

8.5 ESTIMATED REFERENCE LEVEL

Table 33 below depicts the ER program's final Reference Emission Level based on the average historical emissions in the Program area over the historic reference period from 2004 to 2014, as well as the upward adjustment, calculated above.

Table 33: ER Program Reference Level

ERPA term year t	Average annual historical emissions from deforestation (tCO2/yr)	Average annual historical emissions from degradation (tCO2/yr)	Average annual historical removals from enhancement of carbon stocks (tCO2/yr)	Adjustment (tCO2/yr)	Total Reference level (tCO2/yr)
1	24,651,957	18,838,100	(1,424,990)	5,611,789	48,022,794
2	24,651,957	18,838,100	(1,424,990)	5,611,789	48,022,794
3	24,651,957	18,838,100	(1,424,990)	5,611,789	48,022,794
4	24,651,957	18,838,100	(1,424,990)	5,611,789	48,022,794
5	24,651,957	18,838,100	(1,424,990)	5,611,789	48,022,794
Total	**123,259,786**	**94,190,502**	**(7,124,952)**	**28,058,945**	**240,113,972**

8.6 RELATION BETWEEN THE REFERENCE LEVEL, THE DEVELOPMENT OF A FREL/FRL FOR THE UNFCCC AND THE COUNTRY'S EXISTING OR EMERGING GREENHOUSE GAS INVENTORY

The Democratic Republic of the Congo is currently establishing its national Forest Reference Emission Level/Forest Reference Level (FREL/FRL), which is envisaged to be submitted to the UNFCCC in September 2016. A methodological note was recently produced by the Ministry of Environment with the support of FAO in November 2015. This note defines the features of the FRL and specifies the work steps to be accomplished by September 2016.

As the national FREL/FRL is not yet completed, key institutions established a working group which aims inter alia at integrating lessons learned from the ER Program REL development into the development of the national REL, as well as to ensure consistency between the provincial- and national REL. Therefore, in the context of the DRC it is expected that the provincial REL will inform the establishment of the national REL and not so much the other way around.

Activity data alignment

Remote sensing literature suggests that classification models involving smaller study areas may be more accurate than larger, more general models. Additionally, the Mai Ndombe sub-national sampling approach uses manual/visual classification method that considers a variety of detailed contextual information in addition to pixel reflectance (context, shape, roughness, etc.). It also includes a calculation of historical degradation, which the national FREL does not. Extensive literature exists on the subject of accuracy assessment for wall-to-wall mapping approaches, in particular where the change rate is low compared to the no-change rate, a situation that is typical in many land-use/land cover change models (Oloffson et al, 2014, Gallaun et al, 2015). To harmonize the national FREL and the Mai Ndombe ER Program REL, it is expected that the Mai Ndombe sub-national samples will be used to inform the national

FREL, and the "good practice guidance" of Olofsson et al.(2014)will be used to estimate an adjusted national deforestation rate for the Mai Ndombe Province.

The harmonization will be carried out in the following steps:

1. **Harmonizing the Land Cover Classes**: The Mai Ndombe ER-Program REL features five land cover classes whereas the national FREL comprises three classes. To ensure comparison of similar temporal transition classes, we filter the Mai Ndombe sub-national samples by flagging those samples that fit into the same 3 IPCC transition categories that the national FREL map contains (see table below). Samples that are not flagged are discarded from this study. To integrate the MNDP REL into the national REL, land cover classes will be harmonized as specified in the following table:

DRC National FREL change category (2000-2010)	Mai Ndombe sub-national sample transition (2004-2010)	Reference Sample Label
Stable Forest	2004: **PF** -> 2010: **PF**	**STABLE PF**
Stable Non-forest	2004: **NF** -> 2010: **NF**	**STABLE NF**
Deforested	2004: **PF** -> 2010: **NF**	**DEFORESTED**

2. **Comparing the two datasets at the location of each reference sample**, as exemplified in the figure below (note that this map is an example fabricated to demonstrate the comparison method described in this study. The actual national FREL map was not available at the time of writing.)

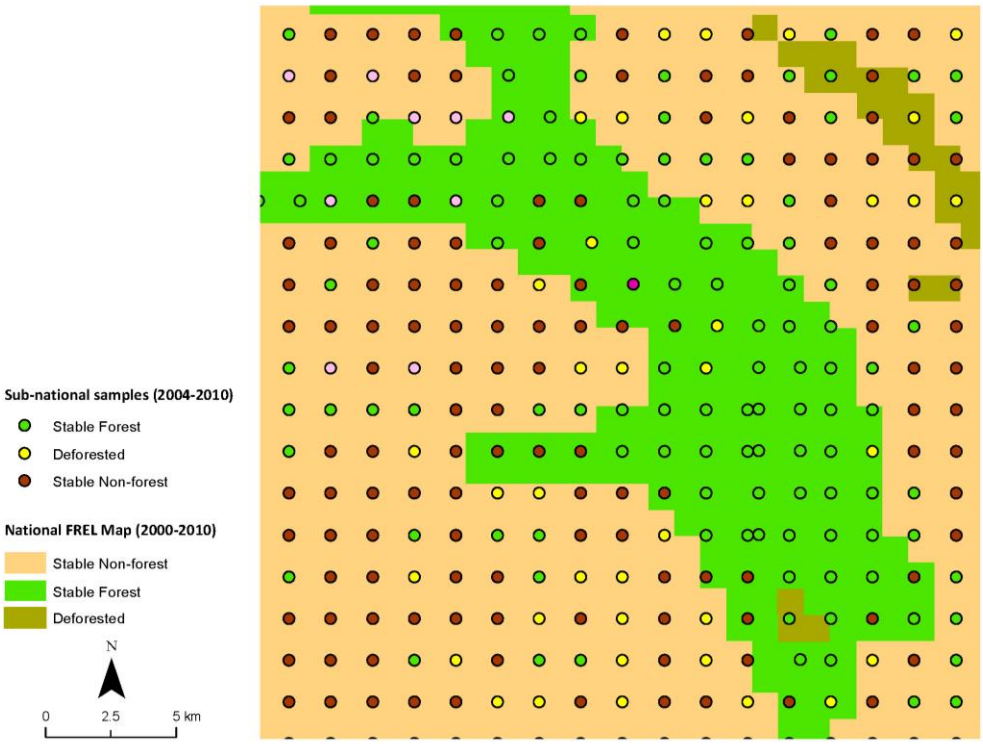


Figure 15 Example comparison of national deforestation map and sub-national samples

3. **Comparing the value of the national deforestation map at the location of the sub-national reference samples**. This comparison will produce a confusion matrix per Oloffson et al, 2014 section 3.5.
4. We follow the procedure in Oloffson 2014, section 4.4 **to determine the adjusted area deforested for the Mai Ndombe province for the national results**. This area incorporates comparison errors between the reference samples and the national map. Olofsson separates these comparison errors into 2 categories: Errors of commission ("User's error") and errors of omission ("Producer's Error"), which conceivably result in area adjustments both up and down.

Because the time period over which the Mai Ndombe ER-Program reference level and the national FREL differ, we will only use data from the national FREL that matches the Mai Ndombe ER-Program reference level (2004-2014), thereby assuring temporal model alignment. This process allows for building on the achievements and lessons learned of the Mai-Ndombe reference level development.

Emission factor alignment

The Mai Ndombe ER-Program has developed its emission factors using a LiDAR-based biomass map. The DRC approved the biomass map in October, 2016 through an external validation conducted by DIAF using inventory data not used in the model calibration.

Because it appears that emission factors for the national approach and the Mai Ndombe ER Program will be developed from the same model, this means that the same biomass data and allometry will be used for both national and sub-national approaches. Thus, the two will be inherently aligned, which not only meets the requirements of the Methodological Framework, but greatly simplifies the DRC's REDD+ nesting process.

Consistency with national GHG inventory

In terms of national GHG inventory, two national GHG inventories have been prepared as part of the two national communications submitted by DRC to the UNFCCC. The first one[60] covered the year 1994, while the second[61] covered the period 1999 to 2003, so there is partial overlap with the historical period of the national FREL/FRL. In terms of future communications, it is expected that the new data produced for the national FREL/FRL will serve to update past GHG inventories and future inventories. As such there are clear institutional arrangements whereby DIAF (responsible of operating the NFMS) must report to the PPP (focal point for UNFCCC), who will in turn will report to the UNFCCC. Since the provincial REL will inform the national FREL/FRL and this will inform the national GHG inventory as shown above.

[60] Submitted 21 November 2000.

[61] Submitted 28 November 2009.

9. APPROACH FOR MEASUREMENT, MONITORING AND REPORTING

9.1 MMR APPROACH FOR ESTIMATING EMISSIONS AND REMOVALS DURING THE ER-PROGRAM PERIOD OCCURRING UNDER THE ER PROGRAM WITHIN THE ACCOUNTING AREA

GENERAL OUTLINE OF THE MONITORING SYSTEM

This Section describes the general outline of the monitoring plan and is inherently linked to the Reference Emission Level approach laid out in Section 8.

The monitoring system uses the same methods for quantifying emissions and removals as the REL to produce fully consistent results as a basis for quantifying emission reductions. Activity Data is estimated using the same Approach 3 method (i.e. sampling using the same methodology) and Emission Factors will be equivalent to those used in the REL, therefore being consistent with Indicators 14.1 - 14.3 of the MF. For monitoring purposes, more accurate methods (i.e. GPS for delineation of vegetation and specific terrestrial inventories) will be used for monitoring enhancement of carbon stocks in delineated ER program activities (e.g. lumber plantations, assisted natural regeneration).

Monitoring occurs at different levels and for different purposes. Hence monitoring can be differentiated as follows:

- **The carbon accounting monitoring system** that is used to report emissions and removals (based on measured activity data) to third parties (i.e. Carbon fund) during the program period is operated by the Program Management Unit (PMU). The PMU will carry out QA/QC measures – either itself or through third parties – to ensure a high quality of monitoring results prior to verification. (The present section describe this monitoring level).
- **Performance monitoring of different emission reduction activities** will be carried out by operators and executing agencies. Here, the PMU will take a verifying role. The monitoring of performance of activities is the basis to implement the benefit-sharing plan (see Section 15). The detailed description of these monitoring procedures are in development and will be presented in the Benefit-Sharing Plan that will be finalized before ERPA signature.

Calculation of uncertainty for emission reductions: Uncertainty related to the quantity of emission reductions will quantify using Monte Carlo methods. Underlying sources of error in data and methods for integrated measurements of deforestation, forest degradation and enhancements (e.g. as in a national

forest inventory) will be combined into a single combined uncertainty estimate and will be reported at the two-tailed 90% confidence level.

MONITORING OF DEFORESTATION, DEGRADATION AND ENHANCEMENT OF FOREST CARBON STOCKS

MMR System Objectives

The following section outlines the ER Program's approach to accurately account for emissions from deforestation, degradation and enhancement of forest carbon stocks during the ER Program period (term of the ERPA).

The FCPF MF requires the application of the technical specifications of the National Forest Monitoring System (NFMS) for monitoring and reporting where possible. The NFMS is currently under development and it is not yet operational, but it is expected that only deforestation will be monitored in an annual basis, that the monitoring of AD will be done through a wall-to-wall Approach 3 with a MMU of 0.86 ha and that the Emission Factors will be consistent with those of the national FREL/FRL to be submitted to the UNFCCC which are to be defined. Therefore, the same technical specifications of the NFMS cannot be used for the MMR system of the ER Program as the scope (i.e. no monitoring of degradation and enhancement of carbon stocks), the approach (i.e. wall-to-wall vs. sampling) and the accuracy (i.e. the ER program MMR relies on a sampling approach with a MMU of 0.07 ha vs. 0.86 of the NFMS). However, it is expected that the NFMS will incorporate methods or data from the ER program, in particular the adjustment of AD using the ER program monitored results - similar to the method described in Section 8.6 - or the NFMS might use the same approach for estimating AD for degradation.

The proposed MMR system will observe the following objectives:

- The primary objective is to monitor land cover change that occurs during the implementation of the ER Program. This system will allow for the subsequent comparison between program emissions and the reference level, leading to the quantification of emission reductions (ERs) which may in turn be sold and generate carbon revenues for ER Program stakeholders.
- The MMR system shall quantify deforestation and degradation in a spatially explicit manner, thereby facilitating the just sharing of financial benefits, based on performance.
- Finally, the MMR system will assess individual activities and provide valuable feedback to the ER Program that could in turn refine ER Program investment strategy and planning. The ER Program plans to integrate the MMR system into its overall adaptive management strategy: MMR results will lead to re-investment of carbon revenues in the ER Program for various high-performing emission reduction activities.

MMR Design

The MMR design for the ER Program (sub-national MMR design) was designed to be harmonized with the ER Program's reference level design (See Section 8.6). As such, the MMR system will employ a sampling approach that utilizes identical manual/visual classification rules used for calculation of the ER Program REL. Additionally, the MMR system will take advantage of the amelioration rules described above in the REL Section 8, allowing spurious sample observations to be improved, and ultimately minimizing MMR error. This will allow full consistency with the methods used to estimate the Activity Data for the REL.

The system will also be subject to the same robust accuracy assessment requirements as the REL, which are based on Olofsson 2014 / Cochran, 1977, and which will serve to adjust the estimated areas and

estimate their confidence intervals at 90% of confidence level. The adjusted areas and the respective confidence intervals will serve as input parameters for a Monte Carlo simulation, which will combine the AD to the Emission Factors.

Although it is expected that the same sampling points used for the RL will be used for monitoring, an intelligent and adaptive sample design will be utilized, with a greater density of samples utilized in areas of high importance to the ER Program. This increase in sampling intensity will not impact the consistency with the methods used to estimate the RL as it will only reflect a higher accuracy and precision (as determined by the accuracy assessment) in those areas of interest. Examples of such areas of interest (AOIs) are community forests or conservation concession that engage in a of pay-per-performance emission reduction activities, areas have been observed to experience particularly high emissions in the past, politically important regions, etc. More (or less) samples can be concentrated in particular areas moving forward as additional information becomes available. For example, if a village is observed to have deforested an unusually high amount of land in 2016, the 2017 MMR system will be implemented in with additional samples surrounding that village which will estimate the deforestation in 2017 with higher accuracy and precision. To ensure an unbiased estimator at the ER Program level, these AOIs will be defined as a standalone stratum to avoid that these oversampled areas affect the average estimate. In addition to an adaptive approach to sample design, and like the REL model, the MMR system is designed with a flexible approach toward manual/visual image interpretation. High-resolution imagery may be utilized for AOIs, allowing for increased spatial precision of emission estimates. However, because such imagery can often be both expensive and difficult to obtain, the MMR model does not require a particular image resolution, but simply requires a spatial resolution that allows analysts to identify land cover categories in the ER Program area. The flexibility of both sample design and spatial resolution of imagery allows the MMR model to integrated into the ER Program's adaptive management philosophy. MMR system attributes are listed below, in Table 34 below.

Table 34: ER Measurement, Monitoring and Reporting System Attributes

Attribute	Advantage
Sampling approach design	Harmonization with reference level model, allowing for accurate calculation of ERs. Primary advantage of sample alignment is the availability of historical land cover information for each sample, allowing for the application of amelioration model.
Flexible sample design	Adaptive management allowing for high sample density in AOIs. This leads to greater precision and accuracy of these areas. The different sampling intensity per AOIs will be considered using a stratified estimator.
Use of various spatial-resolution remote sensing imagery.	Adaptive management / utilization of high-resolution imagery in different areas throughout the ER Program area, allowing for greater precision of ER estimates in AOIs.

As mentioned above, harmonizing the MMR and the reference level model offers the added advantage of utilizing historical land cover information at each sample location. The model may therefore utilize the amelioration approach to minimize potential bias and error in the MMR system. It should be noted that amelioration and the use of historical land cover information will only be used to estimate current emission reductions, not to permanently change historical ER calculations, as this would present problems in permanence for verified and purchased ERs.

Monitoring parameters

Only parameters related with the Activity Data will be monitored as the Emission Factors and Removal Factors will be kept constant throughout the ERPA term.

Parameter	**Deforestation (ΔA_j in EQ 5)**
Description:	Applicable to all transitions from Primary Forest to Non-Forest during the monitoring period
Data Unit	ha/yr
Source of data or measurement/calculation methods and procedures to be applied:	The following data sources will be used: ▪ Global Forest Watch for the pre-identification of potential areas of change; ▪ Landsat 8 (OLI) and 7 (ETM +) for the development of forest area benchmark maps; ▪ Landsat 8 (OLI) for monitoring; ▪ High-resolution imagery for the conduction of QA and accuracy assessment. The same amelioration rules and calculation procedures as described in Section 8.3 will be applied.
Frequency of monitoring/recording:	Biennial
Monitoring equipment:	Manual classification of samples using satellite imagery (Landsat 8 OLI)
Quality Assurance/Quality Control procedures to be applied:	▪ Identification of high resolution samples for each stratum; ▪ Comparison of samples with the forest area benchmark map; ▪ Development of a change matrix to determine the accuracy of each stratum; ▪ Correction of the forest area benchmark map by the 90% confidence interval.
Identification of sources of uncertainty for this parameter	Uncertainty stems primarily from errors made in manual classification of Landsat imagery.
Process for managing and reducing uncertainty associated with this parameter	• Quality Control: Same Standard Operating Procedures (SOPs) as used for estimating the AD for the RL will be used to ensure no systematic errors in the classification. Adequate training will be provided; • Quality Assurance: An Accuracy Assessment using Olofsson et al. (2014) and Cochran, 1977will be conducted to derive adjusted areas and associated confidence intervals at 90% of confidence level.
Any comments:	-

Parameter	**Secondary deforestation (ΔA_j in EQ 5)**
Description:	Applicable to all transitions from Secondary Forest (SF) to Non-Forest (NF) during the monitoring period
Data Unit	ha/yr
Source of data or measurement/calculation methods and procedures to be applied:	The following data sources will be used: ▪ Global Forest Watch for the pre-identification of potential areas of change; ▪ Landsat 8 (OLI) and 7 (ETM +) for the development of forest area benchmark maps; ▪ Landsat 8 (OLI) for monitoring; ▪ High-resolution imagery for the conduction of QA and accuracy assessment. The same amelioration rules and calculation procedures as described in Section 8.3 will be applied.
Frequency of monitoring/recording:	Biennial
Monitoring equipment:	Manual classification of samples using satellite imagery (Landsat 8 OLI)
Quality Assurance/Quality Control procedures to be applied:	▪ Identification of high resolution samples for each stratum; ▪ Comparison of samples with the forest area benchmark map; ▪ Development of a change matrix to determine the accuracy of each stratum; ▪ Correction of the forest area benchmark map by the 90% confidence interval.
Identification of sources of uncertainty for this parameter	Uncertainty stems primarily from errors made in manual classification of Landsat imagery.
Process for managing and reducing uncertainty associated with this parameter	• Quality Control: Same Standard Operating Procedures (SOPs) as used for estimating the AD for the RL will be used to ensure no systematic errors in the classification. Adequate training will be provided; • Quality Assurance: An Accuracy Assessment using Olofsson et al. (2014) and Cochran, 1977will be conducted to derive adjusted areas and associated confidence intervals at 90% of confidence level.
Any comments:	-

Parameter	**Degradation (ΔA_j in EQ 8)**
Description:	Applicable to all transitions from Primary forest (PF) to Secondary Forest (SF) during the monitoring period
Data Unit	ha/yr
Source of data or measurement/calculation methods and procedures to be applied:	The following data sources will be used: ▪ Global Forest Watch for the pre-identification of potential areas of change; ▪ Landsat 8 (OLI) and 7 (ETM +) for the development of forest area benchmark maps; ▪ Landsat 8 (OLI) for monitoring; ▪ High-resolution imagery for the conduction of QA and accuracy assessment. The same amelioration rules and calculation procedures as described in Section 8.3 will be applied.
Frequency of monitoring/recording:	Biennial
Monitoring equipment:	Manual classification of samples using satellite imagery (Landsat 8 OLI)
Quality Assurance/Quality Control procedures to be applied:	▪ Identification of high resolution samples for each stratum; ▪ Comparison of samples with the forest area benchmark map; ▪ Development of a change matrix to determine the accuracy of each stratum; ▪ Correction of the forest area benchmark map by the 90% confidence interval.
Identification of sources of uncertainty for this parameter	Uncertainty stems primarily from errors made in manual classification of Landsat imagery.
Process for managing and reducing uncertainty associated with this parameter	• Quality Control: Same Standard Operating Procedures (SOPs) as used for estimating the AD for the RL will be used to ensure no systematic errors in the classification. Adequate training will be provided; • Quality Assurance: An Accuracy Assessment using Olofsson et al. (2014) and Cochran, 1977will be conducted to derive adjusted areas and associated confidence intervals at 90% of confidence level.
Any comments:	-

Parameter	**Regrowth (ΔA_j in EQ 8)**
Description:	Applicable to all transitions from Secondary Forest (SF) to Primary forest (PF) during the monitoring period
Data Unit	ha/yr
Source of data or measurement/calculation methods and procedures to be applied:	The following data sources will be used: ▪ Global Forest Watch for the pre-identification of potential areas of change; ▪ Landsat 8 (OLI) and 7 (ETM +) for the development of forest area benchmark maps; ▪ Landsat 8 (OLI) for monitoring; ▪ High-resolution imagery for the conduction of QA and accuracy assessment. The same amelioration rules and calculation procedures as described in Section 8.3 will be applied.
Frequency of monitoring/recording:	Biennial
Monitoring equipment:	Manual classification of samples using satellite imagery (Landsat 8 OLI)
Quality Assurance/Quality Control procedures to be applied:	▪ Identification of high resolution samples for each stratum; ▪ Comparison of samples with the forest area benchmark map; ▪ Development of a change matrix to determine the accuracy of each stratum; ▪ Correction of the forest area benchmark map by the 90% confidence interval.
Identification of sources of uncertainty for this parameter	Uncertainty stems primarily from errors made in manual classification of Landsat imagery.
Process for managing and reducing uncertainty associated with this parameter	• Quality Control: Same Standard Operating Procedures (SOPs) as used for estimating the AD for the RL will be used to ensure no systematic errors in the classification. Adequate training will be provided; • Quality Assurance: An Accuracy Assessment using Olofsson et al. (2014) and Cochran, 1977will be conducted to derive adjusted areas and associated confidence intervals at 90% of confidence level.
Any comment:	-

Parameter	**Secondary regrowth (ΔA_j in EQ 5)**
Description:	Applicable to all transitions from Non-Forest (NF) to Secondary Forest (SF) during the monitoring period
Data Unit	ha/yr
Source of data or measurement/calculation methods and procedures to be applied:	The following data sources will be used: ▪ Global Forest Watch for the pre-identification of potential areas of change; ▪ Landsat 8 (OLI) and 7 (ETM +) for the development of forest area benchmark maps; ▪ Landsat 8 (OLI) for monitoring; ▪ High-resolution imagery for the conduction of QA and accuracy assessment. The same amelioration rules and calculation procedures as described in Section 8.3 will be applied.
Frequency of monitoring/recording:	Biennial
Monitoring equipment:	Manual classification of samples using satellite imagery (Landsat 8 OLI)
Quality Assurance/Quality Control procedures to be applied:	▪ Identification of high resolution samples for each stratum; ▪ Comparison of samples with the forest area benchmark map; ▪ Development of a change matrix to determine the accuracy of each stratum; ▪ Correction of the forest area benchmark map by the 90% confidence interval.
Identification of sources of uncertainty for this parameter	Uncertainty stems primarily from errors made in manual classification of Landsat imagery.
Process for managing and reducing uncertainty associated with this parameter	• Quality Control: Same Standard Operating Procedures (SOPs) as used for estimating the AD for the RL will be used to ensure no systematic errors in the classification. Adequate training will be provided; • Quality Assurance: An Accuracy Assessment using Olofsson et al. (2014) and Cochran, 1977will be conducted to derive adjusted areas and associated confidence intervals at 90% of confidence level.
Any comments:	-

MONITORING OF NEW DELINEATED FORESTS ESTABLISHED BY ER PROGRAM ACTIVITIES

Objectives

Although the MMR system will monitor comprehensively GHG emissions and removals from deforestation, forest degradation and enhancement of carbon stocks in existing forests and new forests, the estimates of enhancement of carbon stocks in new forests will be improved through accurate monitoring in delineated ER program activities.

It is widely known that the monitoring of afforestation[62]/reforestation[63] activities (both enhancement of carbon stocks in new forests) in the first years since implementation is challenging with remote sensing techniques as they are not detected with widely used sensors (e.g. Landsat) until the canopies are closed and trees reach certain level of maturity. Therefore, the good practice is to use more accurate data or auxiliary data to monitor these activities in the first years since implementation. In the framework of the ER program, it is expected that as part of the "Performance monitoring", GHG removals from Afforestation/Reforestation activities will be monitored with accurate methods, so the reported information will be used to improve the estimates of GHG removals by enhancement of carbon stocks (in new forests) reported by the MMR system.

Design

The ER Program will ensure that double counting of removals of A/R activities do not occur. This will be assured through the subsequent steps:

- A/R activities will be implemented on areas that are clearly delineated. The implementing agency (e.g. NGO) will provide shape files to the ER Program prior to the implementation of the A/R activity and they will be integrated in the ER Program's database.
- Such areas will not be included within the scope of the MMR monitoring (i.e. samples falling on the delineated area will be removed and the areas will not be considered in the inference made for the AD estimation by the MMR.

This will ensure the appropriate accounting of removals under A/R activities within the overall accounting and monitoring framework.

In terms of quantification, the module for 'Afforestation / Reforestation' (A/R) will be used to estimate removals due to afforestation and reforestation of any land located in the ER Program area that does not qualify as forest according to the national definition of forest. The A/R module hence accounts for the increment of forest carbon stocks in trees applicable to areas, which do not qualify as forest prior to the mitigation activity.

The A/R module is based on the following documents:

[62]Per 2006 IPCC GL afforestation is defined as "The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources".

[63]Per 2006 IPCC GL reforestation is defined as "Direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to no forested land. For the first commitment period, reforestation activities will be limited to reforestation occurring on those lands that did not contain forest on 31 December 1989.".

- Small Scale CDM methodology 'Afforestation and Reforestation Project Activities implemented on Lands other than Wetlands', Version 3, CDM EB75, annex 32.
- A/R Methodological Tool 14: 'Estimation of Carbon Stocks and Change in Carbon Stocks of Trees and Shrubs in A/R CDM Project Activities', Version 4.1, CDM EB75, annex 26.

The module is applicable to activities which do not burn the A/R area for clearing the area for Afforestation / Reforestation. This will ensure that the A/R activity does not result in the emission from potent greenhouse gases such as CH_4 and N_2O, which are not accounted for and hence would undermine the environmental integrity of the ER Program.

The module is applicable to activities that reforest areas that do not qualify as wetland. This will avoid releasing potential emissions from wetland soils such as CH_4 and N_2O.

Once an entity (e.g. a community or a NGO supporting a community) proposes the ER Program to include an A/R activity for the accounting of removals, the following procedure applies:

- The proposing entity shall provide a shape file of the area subject to reforestation. Moreover the proposing agency shall confirm in writing, that the area will not be cleared through burning.
- The ER Program will compare the proposed area with the forest area benchmark map and with the wetland map to verify/falsify whether the area qualifies as forest and/or as wetland.
- If the area qualifies as forest and/or wetland, or if fire is used to clear the reforestation area, then the area will not be added to the A/R stratum.

The A/R module determines the net anthropogenic GHG removals by sinks as follows:

EQ 12

$$C_{A/R,t} = \sum_{i=1}^{n} C_{actual.i,t} - \sum_{i=1}^{n} C_{pre-existing,i}$$

Where:

$C_{A/R,t}$	=	Net anthropogenic GHG removals by sinks, in year t; t CO2-e
$C_{ACTUAL.i,t}$	=	Actual GHG removals due to the implementation of the A/R activity, for area i, in year t, in t CO_2e
$C_{EXISTING,i}$	=	Carbon stocks of pre-existing vegetation, for area i, in t CO_2e. This is the vegetation that was present at the time of the establishment of the A/R activity.

The carbon stocks of pre-existing vegetation ($C_{\mathrm{pre-existing,i}}$) are determined using the results of the LIDAR carbon map (see map Annex 19). The LiDAR map provides special explicit carbon stock estimates for the Savannah comprising carbon stored in trees and shrubs. This allows for an efficient and accurate approach of determining the carbon stocks of the existing vegetation, prior to the implementation of the A/R activity.

Monitoring parameters

Parameter:	**$b_{TREE,i}$**
Description:	Tree biomass per hectare in plot p of stratum i;
Data unit:	T d.m./ha
Source of data:	The biomass stock will be measured in accordance with the standards and procedures stipulated in CDM EB75, Annex 26, Appendix 1 (p24ff)
Frequency of monitoring/recording:	For each issuance, after the A/R sites qualify as forest
Monitoring equipment:	
Quality Assurance/Quality Control procedures to be applied:	The A/R areas will be monitored through remote sensing techniques. The carbon stocks will only be measured if the remote sensing analysis qualifies the A/R site as forest in compliance with DRC's definition of forest.
Identification of sources of uncertainty for this parameter	Variance of mean biomass stock in stratum I;
Process for managing and reducing uncertainty associated with this parameter	▪ Biomass plots of strata will be measured following CDM AR-tool 14, 'Estimation of Carbon Stocks and Change in Carbon Stocks of Trees and Shrubs in A/R CDM Project Activities'; ▪ A training manual will guide monitoring activities.

Parameter:	**A_i**
Description:	Area of the Afforestation/ Reforestation Stratum i;
Data unit:	In hectare
Source of data:	The areas are identified during community land use planning processes and are determined using GPS tracking devices. The resulting polygons will be submitted by communities/supporting NGOs to the Program.
Frequency of monitoring/recording:	Once
Monitoring equipment:	GPS tracking device
Quality Assurance/Quality Control procedures to be applied:	The following QA/QC procedures apply: ▪ The A/R area shall be approved as such through the TA ▪ Prior to accepting the A/R area for carbon stock removals, the ER program will verify that the area does not qualify as forest regarding the forest area benchmark map. ▪ Prior to accepting the A/R area for carbon stock removals, the ER Program will verify that the area does not qualify as wetland.
Identification of sources of uncertainty for this parameter	N.A.
Process for managing and reducing uncertainty associated with this parameter	N.A.

9.2 ORGANIZATIONAL STRUCTURE FOR MEASUREMENT, MONITORING AND REPORTING

The Program Management Unit will assume the overall responsibility for conducting the MRV function. As outlined in the figure below presenting the ER-Program tentative schedule, the reporting will be conducted on a biennial basis. Reporting for the emissions, removals and emission reductions will be conducted in the year after the occurrence of emissions/removals.

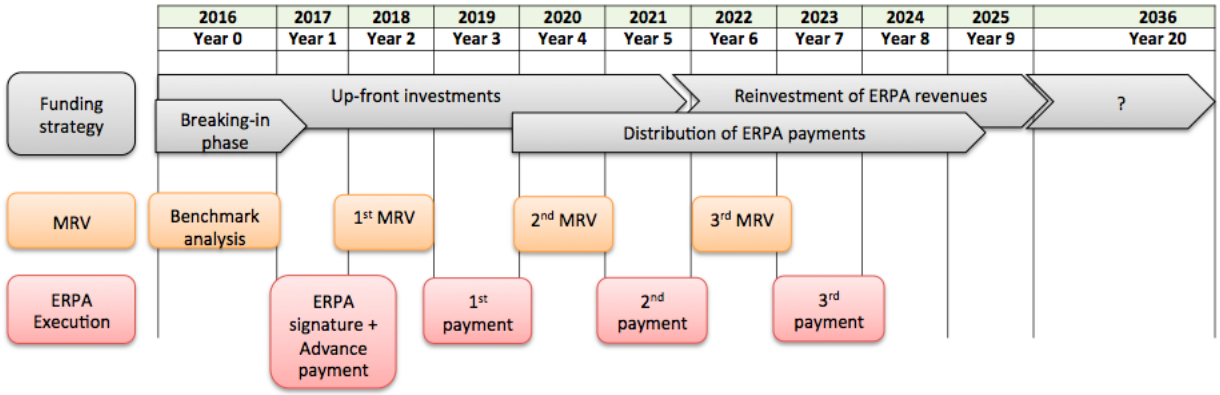


Figure 16: ER Program tentative schedule

The PMU will implement the monitoring and relevant QA/QC procedures with a mixed-team composed of local expert involved in Reference Level measurement (OSFAC) and of administration agents from both national and provincial level (DIAF). This will ensure capacity building and facilitate the link with the National Forest Monitoring System currently in development (See Section 9.3).

As described in Section 6.1 about institutional arrangements, the PMU will consolidate a carbon monitoring report that will be endorsed by the Provincial REDD+ Steering Committee and then transferred to the Carbon Fund by the central government. (See figure below). This monitoring report will serve as a basis for the ERPA payments.

The monitoring system, as explained in Section 9.2, will also provide information for the benefit-sharing mechanism. The spatial information generated by sampling analysis will be crosschecked with field information reported by operators and executing agencies. For example:

- Forest companies engaged in Reduced-Impact logging will report on specific indicators (to be defined in sub-contracts). The PMU will conduct independent field verification that will be crosschecked with remote-sensing information.
- Communities or local organizations involved in reforestation or assisted natural regeneration activities will report on area reforested. The PMU will verify occurrence of fire based on FIRMs requests.

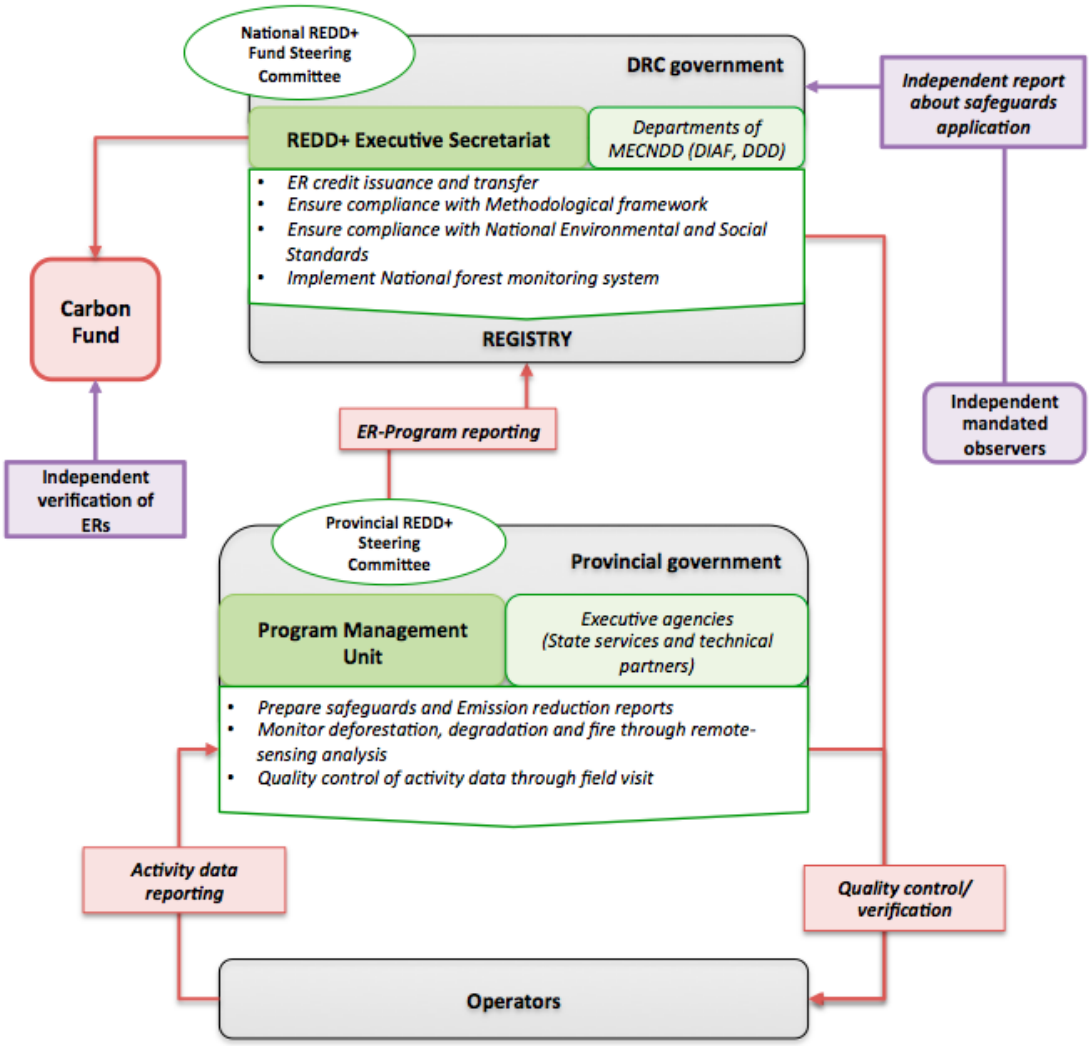


Figure 17: Role and responsibilities for monitoring and reporting of carbon and non-carbon performance

9.3 RELATION AND CONSISTENCY WITH THE NATIONAL FOREST MONITORING SYSTEM

Activity data alignment

The Mai Ndombe ER Program MMR system will be aligned with the National Forest Monitoring System (NFMS) using the same method described in Section 8.6. Because the NFMS is not established at the time this document was written, the Mai Ndombe ER Program MMR system has been designed in such a way that it will be possible to use the samples to inform the NFMS in the same way that the ER Program REL samples will inform the national FREL. Olofsson et al.(2014) will be used to develop an error matrix using the Mai Ndombe ER Program MMR system samples and the NFMS areas results. If the two results do not end up aligning spatially, one of the models will be spatially extrapolated to ensure spatial alignment. The same assumptions made in Section 8.6 will hold true for the Mai Ndombe ER Program MMR system and the NFMS system: the assumption is made that the Mai Ndombe ER Program MMR system is more

accurate, because its study area is smaller, it utilizes a manual/visual process, measures more activity data categories and the study areas is smaller. Therefore, the Mai Ndombe ER Program MMR system will inform the NFMS, resulting ultimately in adjusted values for the NFMS

Emission factor alignment

Emission factors will not be monitored, but as mentioned above, the national biomass is based on the same Carbon Map & Model-based biomass map. Therefore, the national and sub-national emission factors will be inherently aligned (they will be calculated using the same biomass map). It is possible, however, that differences in the national and sub-national emission factors will exist, as many factors go into the calculation of local emission factors that may differ for national emission factors.

It is expected that the sub-national emission factor estimates will be more accurate than those used at the national level. This should relax the requirement for precise alignment between both national and sub-national levels. However, as part of the national process, the working group in charge of the preparation of the national FREL/FRL will take into consideration the data and lessons learned in the ER-program level and will also seek harmonization whenever possible.

10. DISPLACEMENT

10.1 IDENTIFICATION OF RISK OF DISPLACEMENT

Table 35 below provides a summary of the analysis of drivers and agents with emphasis on the risk of displacement, based on the detailed analysis provided in Section 4.1.

This Section discusses the associated risk of displacement for each driver of deforestation / degradation (i.e. 'Justification of risk assessment'). Please note that this evaluation discusses the risk of 'Activity Shifting' and 'Market Leakage/Displacement' separately.

This leads to the proposed 'Initial Displacement Risk' categorization (i.e. high, medium or low) that is complemented by an assessment of the driver's significance for the overall emission levels. The findings for the initial risk rating as well as for the driver's significance are used as input for the displacement risk strategy and its prioritization in the subsequent Section 10.2.

Table 35: Evaluation of the risk of displacement

Driver	Agent	Initial Displacement Risk	Significance	Justification of risk assessment
Shifting cultivation	*Local population*	*Medium*	*High*	Shifting cultivation is mainly achieved by local population for both subsistence and for sale towards Kinshasa's markets. **Activity Shifting:** Displacement of shifting cultivation would require the local population to re-locate their agricultural activities or move to outside the program area that is unlikely. Further it is important to note, that the ER Program does not take any prohibitive measures regarding agricultural practices, or any measures to reduce the area under cultivation. Specifically, if need for additional agricultural areas arises (in addition to the newly established agro-forestry areas, cp AS1, Section 4.3), incentives and support will be provided to establish agricultural areas in the Savannah (cp. AS2). **Market Leakage:** However, shifting cultivation produces, to a limited extent, products for Kinshasa. If Mai Ndombe would reduce its supply of agricultural products, the shortfall would lead to an increase of prices, and to an increase of production (and deforestation/degradation) elsewhere. Hence, if the mitigation activities should lead to a reduction of the supply of agricultural products (which is not envisaged), market leakage would be likely to occur.

Charcoal production	*Local population*	*Medium*	*High*	Local population in the ER program area produces woodfuel, which partially is used, for meeting subsistence needs partially is converted to charcoal being supplied to Kinshasa to meet the city's energy demand. **Activity Shifting:** It is important to note, that charcoal production is typically a byproduct of shifting cultivation, i.e. the wood which is cut to clear areas for agricultural production, is used for charcoal production. Considering the linkage between clearing land for agricultural activities and charcoal production, it is not considered likely that communities living in the ER Program area will shift charcoal production to areas outside of the ER Program area. Consequently, the potential for direct leakage is considered to be limited. **Market Leakage:** Kinshasa's population is estimated to 10.12 million with 87% of the population meeting their cooking energy demand through charcoal. Kinshasa's energy demand is estimated to 4.6 million m3 charcoal/year (CIFOR, 2011[64]). Kinshasa's swift growth, fueled inter alia by urbanization, leads to an increase of charcoal demand. Like 'Shifting Cultivation' above it is important to note, that the ER Program does not aim to reduce the existing charcoal supply but merely aims to limit its increase. However, with the envisaged mitigation activities in place, the Mai Ndombe province may not meet the increase of charcoal demand. This leads to the risk of displacement / market leakage which must be addressed by the program's mitigation strategy.
Artisanal logging	*Artisanal loggers*	*High*	*Medium*	Artisanal logging is not conducted based on permanent forest concession licenses and hence is for the government difficult to control. **Activity Shifting:** Unlike for local population, artisanal logging endeavors are not bound to land property and hence may move to other regions when affected by the program strategy to address artisanal and illegal logging. Consequently, a risk of activity shifting is perceived. **Market Leakage:** Timber is supplied to the national and to some extent to international markets. If Mai Ndombe would reduce its timber supply, the supply gap may be closed by other agents in other regions of the DRC. However, the ER Program envisages respective mitigation activities; please refer to the analysis below.

[64] Shure et al, 2011, Woodfuel for urban centers in the Democratic Republic of Congo, CIFOR Brief No 7.

Industrial logging	*Forest concessionaires*	*Low*	*Low*	Unlike artisanal loggers, industrial logging companies are bound to 25-year concession lease contracts. **Activity Shifting:** In 2002, the Government of DRC issued a Moratorium, which prohibits the issuance of new logging licenses. The Moratorium and the general concession lease period avoids that a logging company may close business operations within the Mai Ndombe province and leases a new concession outside the program area. However, if a logging company holds several concessions, displacement inside and outside the Accounting Area, the company may reduce logging intensity in Mai Ndombe and intensify logging outside of Mai Ndombe. Hence, a low risk for activity shifting is perceived. **Market Leakage:** Moreover, as timber is supplied to national and to a limited extend, international markets, market leakage may occur. This effect however is constrained by the Moratorium to the intensification of existing concessions. Hence the risk for market leakage is low. However, the ER program incorporates mitigation measures such as RIL, which do not significantly affect timber production volumes and comprises large-scale reforestation for timber production.
Savannah burning	*Local population& cattle holders*	*Low*	*Low*	While preventing natural regeneration of forests at large scale, Savannah burning serves to a) regenerate pasture land, b) is used for clearing shifting cultivation areas and c) is employed for trapping animals/hunting (despite being prohibited by law). **Activity Shifting:** It is considered as highly unlikely that local communities may relocate to outside the project area because of improved fire management practices and alternative (legal) hunting methods. **Market Leakage:** With respect to a) and b), alternative fire management practices will not affect the overall level of productivity. Due to transport constraints, hunting activities may not supply Kinshasa markets. Hence the perceived risk of market leakage is negligible.

10.2 ER PROGRAM DESIGN FEATURES TO PREVENT AND MINIMIZE POTENTIAL DISPLACEMENT

This section outlines the ER Program's strategy to prevent and to minimize potential displacement. The strategy is based on a prioritization of displacement mitigation actions considering:

- The initial risk of displacement;
- The evaluation of the significance of a specific driver of deforestation / degradation.

Please note, the strategy for the mitigation and minimization displacement risks is an inherent part of the program design and is reflected in the description of sectoral activities and enabling activities, as presented in Section 4.3.

Table 36: Displacement Risk Mitigation Strategy

Rank	Drivers	Displacement risk mitigation measures
1	Shifting cultivation	As general principle, mitigation measures to address emissions from shifting cultivation are designed in a way that production levels are not constrained: ▪ The number of shifting cultivation fields shall remain constant so that communities can proceed with their current livelihoods. ▪ However, if needs for additional fields arise, the communities will create these fields in the Savannah, i.e. without new deforestation. In addition, the ER Program incorporates a set of activities (cp. Section 4.3) to increase the agricultural productivity and hence to mitigate displacement risks: ▪ Mitigation measure AS1 will support the creation of new agroforestry systems in Savannah areas. AS1, being a core element of the ER Program's strategy, will be implemented with a funding volume of 12.43 million USD and is envisaged to create 120.28 million USD income for local communities over ten years. ▪ AS2 will establish 6,000ha of perennial crops in Savannah and 6,000ha of perennial crops in degraded lands. This shall create agricultural products that complement the agro-forestry schemes. ▪ Enabling activity AH1 will strengthen agricultural value chains with the objective to increase the revenues of agricultural activities (i.e. without increasing production). The strategy for addressing shifting cultivation aims at increasing the level of productivity as well as the revenues for products. The ER Program conducted a Cost Benefit Analysis considering the time gap to develop first products which was used to define the timing of compensation/incentive payments (i.e. to bridge that time gap).
2	Charcoal production	Current charcoal demand in Kinshasa is estimated to 792,000 tons per annum where of 30% is supplied by the Mai-Ndombe province (237,600 tons per year). Consequently, an increase in charcoal demand in Kinshasa will lead to deforestation/degradation in Mai Ndombe province. The program's strategy to address charcoal and its displacement risks aims at reducing unsustainable charcoal production while offering two complementary activities and, as a medium-term strategy, reinforce law application and incentivizes sustainable charcoal producers through tax subsidies. The ER Program's strategy for addressing emissions from charcoal considering displacement is as follows: ▪ Enabling activity EH1 will support inter alia the development of simple land management plans ('PSAT') at terroir level that will structure charcoal production in sustainable rotation cycles establishing the basis for sustainable charcoal production. ▪ Sectoral activity ES1 will support the development of assisted natural regeneration following a low-cost approach employing firebreaks. This activity is estimated to create additional 55,000ha of forest stands dedicated to sustainable charcoal production. ▪ Finally, sectoral activity ES2 will support the establishment of short-term rotation reforestation activities for fuelwood/charcoal production. It is assumed that EH1 may slightly reduce charcoal supply already in the short term, whereas ES1 and ES2 will increase charcoal supply in the midterm. Consequently, a risk for displacement exists. Such remaining displacement risk may be compensated by activities aiming at reducing the charcoal demand in Kinshasa i.e. dissemination of improved cook stoves as funded by the FIP.

3	**Artisanal logging**	The ER Program does not specifically address/reduce artisanal logging as driver that limits the overall potential for displacing artisanal logging. Specifically, the ER Program pursues the following strategy: ▪ Sectoral activity FS2 will create local land management plans, which will inter alia delineate areas for logging. This shall prepare the basis for sustainable artisanal logging operations. Under FS2 villages will receive incentive payments for compliance with conservation contracts, which will come as investments into alternative livelihoods. ▪ Complementary, enabling activity FH3 will support the development of community forestry (three areas of 50,000ha each), which will be earmarked for artisanal logging. These activities will support the creation of sustainable artisanal logging operations. Despite having a well-balanced strategy in place this however may lead to limited displacement. Such displacement risks may partially be further mitigated by the creation of dedicated afforestation activities for timber supply (cp. FS4) following a PPP approach for tinder stick production. However, such afforestation activity may compensate potential supplies only in the midterm and leaves a remaining displacement risk in the short term.
4	**Industrial logging**	Reduced Impact Logging (FS1) will reduce the residual damage of logging operations, reduce road width and length but does not significantly reduce logging volumes. The establishment of conservation concessions (FS3) however will reduce logging volumes, and if implemented by logging companies, will lead to a reduction of timber volumes. However considering the constraints of the moratorium, (Please refer to Table) displacement risk is considered to be limited.
5	**Savannah burning**	As discussed in Table above, Savannah burning does not involve any substantial risks for displacement.

11. REVERSALS

11.1 IDENTIFICATION OF RISK OF REVERSALS

The assessment of natural and anthropogenic risks of reversals was conducted following the VCS JNR Non-Permanence Risk Tool, Version 3.0. The tool is used to determine:

- Political and Governance Risk
- Program Design and Strategy
- Carbon Rights and Use of Carbon Revenues
- Funding Risk
- Natural Risk

The following section provides the risk assessment for each of the five risk categories. Please note that, following the structure of the tool, the overall risk is based on the initial risk rating minus the mitigation strategy rating. Hence this section includes the ER Program's mitigation strategy.

POLITICAL AND GOVERNANCE RISK

Table 37 below provides the political- and governance risk assessment for the Democratic Republic of the Congo.

Table 37: **Political and Governance Risk**

Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	DRC's governance score over the amounts to -1.63, Please refer to Table for a detailed assessment.	8
b)	The sub-national jurisdictional program is being coordinated directly by the provincial government and benefits from strong institutional support of the federal government.	0
c)	**Mitigation:** The jurisdictional REDD+ program has been established as long-term initiative that is independent from changes in government. ▪ **Legal**: Inter alia, the program is based on agreements between the DRC and the World Bank's Forest Climate Partnership Facility (FCPF). Clear legal links have been designed between national government as the guardian in respect of national REDD+ standards, provincial government as guardian of good implementation and performance of the program and signatory of the ERPA. ▪ **Sustainability of Mitigation Actions**: Also, individual mitigation activities were designed in a way that ensure	-1

	avoidance of reversal e.g. reforestation of cash crops will ensure that local communities will have higher household income levels in the mid to long term (i.e. without further REDD+ payments) to ensure the long term sustainability of mitigation measures. ▪ **Governance Structure**: an implementation body will assume the management of the program for the first years of the program (please refer to Section 6.1, 'Institutional Arrangements'). The National REDD+ Fund governance structure is currently under operationalization (See Annex 9) and will be managed by UNDP, which will ensure transparent accounting and disbursement of funds. It will allow some time to set transparent and clear scheme under the ER-Program that the provincial government will be able to manage at a medium term. The Provincial REDD+ steering committee has recently adopted terms of reference and will become operational in May. ▪ **Control Mechanisms**: Different mechanism will be implemented to address governance issues as (i) a multi-stakeholder steering committee in charge of validation of the work prepared by the Implementation body, (ii) a transparent grievance and redress mechanism (Please refer to Section 14.3) and, (iii) independent observers as OGF and the MOABI Platform.	
d)	**Mitigation:** The Government of DRC and the provincial Government of Mai Ndombe are committed to improve governance issues within the framework of REDD+ readiness. ▪ A study is currently led to assess timber companies in the ER Program area on their legality of operations to provide a clear and transparent cooperation between companies and the ER Program. This activity will result in a simple and robust monitoring system of legality of timber operations and strengthens the engagement of the administration. ▪ An activity to reinforce on-site control and checkpoint will be implemented to limit and reduce illegal logging and poaching which is often linked to corruption. ▪ As part of DRC's national REDD+ readiness achievements, DRC included REDD+ issues (e.g. land use planning policies, land tenure) in the country's Economic Governance Matrix. This matrix is a key Government planning instrument and is monitored on monthly basis by the Technical Committee for Reform Monitoring (please refer to Section 2.3) However, the provincial government was only elected in March 2016 and its local administration is not yet fully established. Hence the initial risk rating is not amended.	0
Total Political and Governance Risk (PG) [as applicable, (a + b + c + d)]		7

Table 38 below provides information on the overall governance rating of DRC for the years 2009 to 2013 as well as the rating of six individual parameters.

Table 38: **Democratic Republic of the Congo Governance Indicators**						
Year	**2009**	**2010**	**2011**	**2012**	**2013**	**Mean**
Voice &Accountability	-1.45	-1.44	-1.52	-1.51	-1.47	-1.48
Political Stability and Absence of Violence	-1.99	-2.23	-2.24	-2.14	-2.23	-2.16
Government Effectiveness	-1.71	-1.73	-1.67	-1.66	-1.59	-1.67
Regulatory Quality	-1.53	-1.58	-1.52	-1.51	-1.28	-1.48
Rule of Law	-1.63	-1.61	-1.61	-1.65	-1.55	-1.61
Control of Corruption	-1.36	-1.42	-1.40	-1.30	-1.30	-1.36
Five Year Average across all Indicators						**-1.63**
Source: World Bank, 2014, Worldwide Governance Indicators						

PROGRAM DESIGN AND STRATEGY

Table 39 below provides the assessment of the ER Program design risks and related mitigation strategies.

Table 39: Program Design and Strategy		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Default Program Design and Strategy risk rating	10
b)	**Mitigation:** The ER Program incorporates a set of measures that maintain the production levels of significant commodities driving deforestation and degradation. Key commodities and related practices are: ▪ Shifting cultivation leads to the production of manioc, corn, and charcoal, which is partially sold to generate cash income, partially used for domestic purposes. ▪ Industrial timber companies log trees to supply timber to domestic and international markets. The following measures are incorporated in the ER Program to mitigate risk of reversals (cp. Investment Plan): ▪ As general principle, mitigation measures to address shifting cultivation are designed in a way that shifting cultivation is not constrained. The number of shifting cultivation fields so that communities can proceed with their current livelihoods. However, if needs for additional fields arise, the communities will create these fields in the Savannah, i.e. without new deforestation (cp. Draft conservation and reforestation contracts). ▪ The support of agroforestry systems (funding: 12.43 million USD) is envisaged to create additional 120.28 million USD income for local communities over ten years.	-1

- Rehabilitation of cocoa, café, palm oil and rubber plantations (funding: 11.98 million USD) is envisaged to create additional revenues/ products in the amount of 29.11 million USD over 10 years).
- The strategy for addressing emissions from charcoal does not aim at reducing the charcoal production volumes (which seems impossible considering Kinshasa's demand). The rationale is merely to provide incentives for replacing unsustainable- by sustainable charcoal production (Please refer to activities ES1[65], ES2 and EH1, Section 4.3)) while reinforcing governmental control on compliance with the national forest regulation.
- Supported natural regeneration for charcoal production (funding: 3.39 million USD) is expected to produce additional 400,659 t of sustainable charcoal with a value of 9.08 million USD over ten years. This production of sustainable charcoal will complement traditional and currently unsustainable charcoal production, which is envisaged to phase out over time, so that the overall productivity remains at the same level.
- Artisanal logging: The ER Program aims to reduce illegal logging in the program area by the establishment and reinforcement of logging checkpoints and on-site control.
- Conservation concessions will stop timber operations and hence will reduce to a reduction of timber supply. The expected reduction amounts to 1.44 million m3 over five years.
- Reduced Impact Logging is designed in a way to reduce the residual damage of logging operations and reduce road width and length but does not significantly reduce logging volumes.
- The mitigation activity FS4 aims at increasing timber supply on 6,000 ha over five years. The expected timber supply over the first five years amounts to 882,000 m3 that partially compensates for the reductions of conservation concession activities.

Assessment of Program Design Risk Mitigation Strategies			
Drivers	*Type of Driver*	*Program maintains production of commodities at:*	*Program supports agents involved in subsistence drivers*
Shifting cultivation	*Subsistence and Cash Crop*	*Increased level*	*Majority*
Charcoal production	*Mainly commodity but complemented by limited fuelwood collection for substance*	*Same level*	*Majority*
Savannah burning	*N.A.*	*N.A.*	*N.A.*
Logging Operations	*Commodity*	*Decreased level*	*Minority*

Considering that it may not be possible to fully reduce the effects of high charcoal demands from Kinshasa, but considering that the ER Program has an integrated strategy which will does not aim at reducing the overall volume of charcoal production, a reduced risk discount of -1 is proposed.

[65] Please note, ES1 is explicitly conceived as cost effective leakage mitigation activity.

c)	**Mitigation:** The JNR program incorporates a set of measures that maintain the subsistence of local communities. A EU funded study, (Lukwasa et al., 2012) assess the average household (HH) income in the program area through a total of 1,933 interviews. Findings show that the average HH income amounts to 207 USD/HH. The average agricultural area, per HH amounts to 1.20ha/HH. Hence the average annual income per hectare amounts to 172.5 USD. As integral activity, the ER Program will support the development of agroforestry systems (please refer to information 'general principle' and 'agroforestry under 'b)' above). This activity will support local communities in creating agricultural products with a monetary volume that is above current HH income levels. The break-even is estimated for year 4 (cp. related shifting cultivation feasibility study, Carbon Map and Model Project).	-3
d)	**Mitigation:** The jurisdictional program is embedded in the National REDD+ Strategies, which are supported by the FCPF Readiness program. From national perspective, the jurisdictional program is considered as the first application and test pilot of the National REDD+ Strategies. The National REDD+ Strategies are a multi-sectoral initiative approved and supported by the Council of Ministers aiming at the realization of the national vision for green development (Please refer to ERPD Section 2 and National REDD+ Strategy, Section 4.3).	-1
e)	**Mitigation:** The jurisdiction program is developing conservation strategies in consultations with agents of deforestation and degradation: ▪ Groupe de Travail Climat REDD+ (GTCR) is a coordination agency for the participation of the civil society in the program. GTCR is inherently involved in the program design and acts as one of four program partners. ▪ Conservation and agroforestry activities are based signing proxy based payment contracts with local communities, which ensures excellent community involvement. ▪ Many consultations have been done in DRC relative to REDD+ strategy and it will continue at a more local level in implementation phase (Please refer to Section 5).	-1
f)	**Mitigation:** The national government has received or is receiving REDD+ readiness support from UN-REDD and from FCPF, qualifying as multilateral donors supporting the development of REDD+ programs and strategies. Along those lines, DRC has recently submitted his National REDD+ investment plan for funding by CAFI. The ER Program is fully embedded in the national REDD+ plus strategy. Consistency with national REDD+ Strategies and more generally Green Development Strategies creates substantial synergies and will enhance the sustainability of mitigation activities. This limits the risks of reversal. ▪ Examples for such synergies are: The initiative to distribute energy efficient cook stoves in Kinshasa, as funded by FIP, reduces Kinshasa's charcoal demand, while providing the same energy services (i.e. heat for cooking). This will reduce the charcoal demand from the Mai Ndombe province and complements the ER Program activities. CAFI will fund a forest governance reform at national level to address illegal logging. This will support the ER Program's efforts to restructure artisanal logging and support the legality of industrial timber harvesting companies.	-1
Total Program Design and Strategy (PDS) [as applicable, (a + b + c + d + e + f)]		**3**

CARBON RIGHTS AND USE OF CARBON REVENUES

Table 40 below provides the risk analysis of the carbon rights and use of carbon revenues.

Table 40: Carbon Rights and Use of Carbon Revenues		
Risk Factor	**Risk Factor and/or Mitigation Description**	**Risk Rating**
a)	Like many countries, DRC's constitution confers ownership of all natural resources above and below ground on the state (cf. Forestry Code). Congolese law does not recognize carbon rights as a right in rem, however it fully recognizes tenure holdings of all stakeholders – including notably Indigenous Peoples – and it secures that (i) their positions are not diminished in any way by the ER Program, and (ii) that they have a legal claim to REDD+ revenues – including from the sale of ERs – in exchange for their participation and involvement. To ensure the availability of a robust legal and regulatory framework for REDD+, DRC, with support from CN REDD, developed an ambitious action plan (cp DRC R-Package, p19f) that covers, among others, land tenure, carbon-related rights, land-use planning and mainstreaming of REDD+ into the Forest Code. A framework law on the environment was adopted in 2013, and its implementing decrees are being prepared (Law on the Environment). The inherent legal rights and claims notwithstanding, the role of several stakeholders, including Indigenous Peoples in terms of active participation and representation in the REDD+ projects should be strengthened. The Homologation Regulation of 2012 (cf. chapters 4.4 and 18) provides for direct participation and Emission Reduction Credits (ERCs) access through contractual engagement with the authorities. It entails a dedicated state approval process for the recognition of 'project proponents' with direct access to ERCs and the national registry (cf DRC R-Package p.19). However, the process is a complex one, and Indigenous Peoples and civil society associations may face difficulties in practice to engage as active project proponents (rather than as indirect counterparts only).	4
b)	As noted above, carbon rights are in general classified as natural resource and are linked to land titles.	1

c)	**Mitigation:** As further explained in chapter 18, DRC is engaged with support of the FCPF in a reform of its system of creating ERCs. The current regulatory framework – laid out in the Homologation Regulation (cf. chapters 4.4 and 18) – will be revised to allow for more widespread direct engagement of local communities and Indigenous Peoples in particular. The envisioned changes are described in Chapter 18 below. However the policies are not yet enacted and hence a risk discount is not taken into account.	0
d)	**Mitigation:** The jurisdictional program establishes a grievance mechanism to resolve any potential conflicts related to carbon rights and benefit sharing. Please refer to Section 14.3.	-1
e)	There will be no use of carbon revenues for purposes not related to REDD+. The jurisdictional program envisages administrative costs of 7.09 million USD over a period of 10 years for project management, remote sensing, field measurements and financial fund management. This equals 10.0% of the total funding volume.	1
f)	**Mitigation:** There are several best practice standards for stakeholder involvement in place: ▪ DRC established an Environmental and Social Management Framework, which was funded by the FCPF and validated by the World Bank; ▪ With support from UN REDD, a Safeguard Information System was put in place (UN REDD); and ▪ The jurisdictional program is designed to ensure excellent participation of agents (e.g. participatory land use planning and related design of mitigation activities).	-1
Total Carbon Rights and Use of Carbon Revenues (CR) **[as applicable, (a + b + c + d + e + f)]**		**4**

FUNDING RISK

Table 41 below provides the assessment of funding risks.

Table 41: **Funding Risk**		
Risk Factor	Risk Factor and/or Mitigation Description	Risk Rating
a)	Default funding risk	6
b)	**Mitigation:** The cash flow breakeven point is five years or less from the current risk analysis. The jurisdictional program is envisaged to generate carbon revenues in the amount of 72 million USD over the first five years that will result in a surplus of 27.88 million USD. This surplus will be reinvested to scale up emission reductions (cp. investment plan).	-2
c)	**Mitigation:** The jurisdictional program has secured 72.4 million USD of funding (including upfront investments) which cover implementation costs (cp. investment plan).	-2
d)	DRC is not establishing a domestic voluntary or compliance market. Not applicable	0
e)	The Jurisdictional Program is part of the FCPF CF and will sign an ERPA over 15m of emission reductions with an approx. value of 97.5million USD (cp. FCPF). This program is inherently based on a public-private partnership approach inter alia including: ▪ Platform for involvement of private sector industrial timber companies (i.e. FS1 'Reduced Impact Logging' and FS3 'Conservation Concession'). Timber harvesting companies expressed their interest in cooperating with the ER Program. ▪ Involvement of existing private sector mitigation projects (i.e. the Novacel program and the WWC/ERA project with an investment of approx. 2.5 million USD/yr). ▪ SOCALCO, leading match Production Company based in Kinshasa, is developing an agroforestry project within the program framework. This project also includes the establishment of a local thinder stick factory.	-1
Total Funding Risk (FR) [as applicable, (a + b + c + d + e)]		**1**

NATURAL RISK

The jurisdictional program does not perceive any large natural risks due to fire, pests, extreme weather events or any other natural risks. The forest areas are humid also during the dry periods and hence feature a low risk of burning.

To substantiate this opinion, an analysis of the spatial distribution of fire incidents in the Mai Ndombe Province was conducted based on fire events recorded by the MODIS sensor aboard the Terra and Aqua satellites. Fire events from January 2002 to December 2014 were taken into account. Over these 13 years, a total of 138,174 fire events were recorded. Of these, 136,414 could be attributed to have occurred in

either forest land or savannah / shrubland (based on a 2014 land cover map by Saatchi et al. 2015). From these total fire incidents, only 16.9% are located in forest areas.

Considering that a MODIS pixel features a length of 250m, a pixel represents 6.25ha. Assuming that the pixel was completely burnt (which is conservative), the (maximum) areas burnt represent 143,981.7ha. However, according to the results of the REL, the total areas that underwent forest cover change (i.e. primary deforestation, secondary deforestation and degradation) are estimated to 2.7 million ha over the period 2004 to 2014.66

It is concluded that the existing fire detections do not sufficiently explain the measured forest area changes. The results of the analysis provide a strong indication that while fire is used by farmers to clear forests, these fires do not lead to larger scale forest fires as is e.g. the case in Indonesia and other Southeast Asian countries.

The figure below shows a part of the Main Ndombe Province, South East of the Mai Ndombe lake. The figure illustrates that the large majority of fire incidents is located in Savannah and shrubland, whereas fires in forested areas do not occur at large extent.

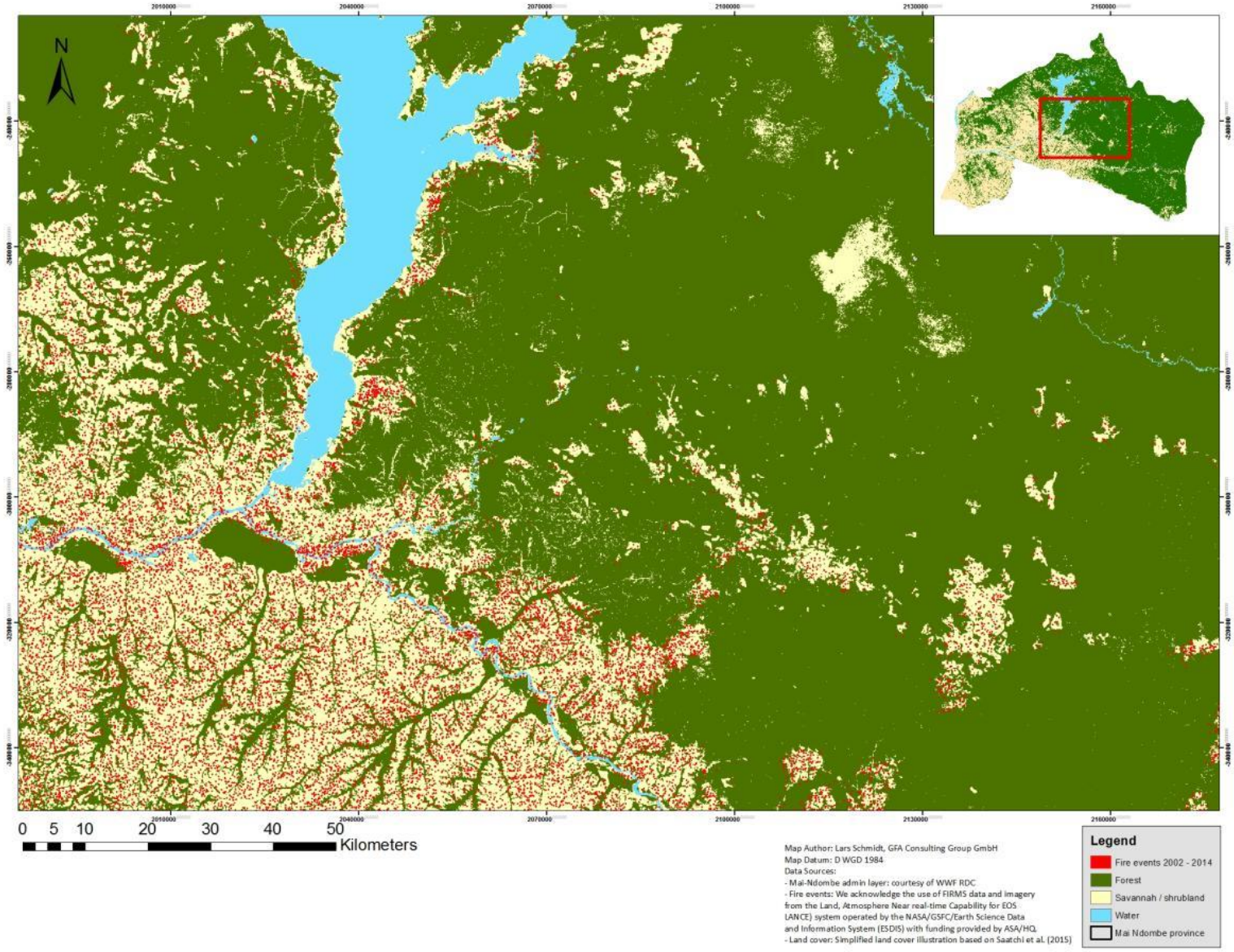
Finally, an accurate LiDAR forest carbon stock map was developed (cp. final report by the Carbon Map and Model project see Annex 19). The map indicates density (in tons dry matter), which is converted to carbon stocks. If large loss events had occurred decades ago, the map would indicate large patches of young forests having low biomass/carbon stock volumes. However such incidents were not identified.

Based on above considerations, natural risks are rated as follows:

Table 42**: Natural Risk**	
Significance	Minor
Likelihood	Every 10 to less than 25 years
Initial Natural Risk Score	5
Mitigation	*No*
Total Natural Risk (NR)	*5*

[66] However, the results of the analysis may be biased insofar, as each MODIS fire location represents the center of a 1km pixel that is flagged by the algorithm as containing one or more fires within the pixel. As such, if the center of the fire location is at the edge of forest / non-forest patch, the fire may have occurred in either or both forest and non-forest. Further, it is important to note, that MODIS fire data does not allow assessing the total area burnt.

Figure 18: Fire Incidents in Part of the MNDP dominated by Forests



OVERALL NON-PERMANENCE RISK RATING AND BUFFER DETERMINATION

This section determines the program's overall risk rating based on the findings of previous sub-sections. The overall non-permanence risk rating is 20 leading to a set-aside of 20% of Emission Reduction in the Reversal buffer.

Table 43**: Overall Risk Rating**

Risk Category	Rating
Political and Governance Risk (PG)	7
Program Design and Strategy (PDS)	3
Carbon Rights and Use of Carbon Revenues (CR)	4
Funding Risk (FR)	1
Natural Risk (NR)	5
Overall Risk Rating [PG + PDS + CR + FR + NR]	20

11.2 ER PROGRAM DESIGN FEATURES TO PREVENT AND MITIGATE REVERSALS

The ER Program design comprises risk mitigation strategies to address four out of five risk categories. The description of the risk mitigation strategies is included under Section 11.1.

It is equally important to consider the difference of mitigation activities and enabling activities. Enabling activities are conceived to support mitigation activities, which ultimately create ERs. If one considers the sustainability of ERs, this is not based on whether enabling activities continue (i.e. a checkpoint is still in place in 2022) but merely whether mitigation activities allowing to create an alternative (low carbon) income is self-sustaining eventually. For example, do agroforestry sites created in the svannah allow to generate higher income than slash & burn agriculture by the time ER payments cease? Consequently, it is argued to limit the question of sustainability of ERs to the scope of mitigation activities.

The ER Program has a well-balanced strategy to ensure sustainability of ERs that combines activities creating a) high upfront volumes of ERs but may have limited sustainability (e.g. FS2) and b) a small amount of ERs and are included because of the high potential for generating non carbon revenues. This strategy is ultimately based on two levels of cost benefit analyses, one on the level of terroirs/individual households (will households have higher income levels after ER payments cease?) and one on the level of the ER Program (does the sum of ER payments allow to cover the sum of investments into activities a) and b) as described above?)[67].

[67] The related study/strategy for shifting cultivation, which served as an input to the financing plan, is available upon request.

The individual mitigation activities may be classified in three categories with respect to their sustainability:

- Mitigation activities A1, A2, ES1, ES2 are sustainable as they create (based on the ER Program's investments) higher revenues compared to alternative land uses.
- Mitigation activities FS1 and FS4 are potentially self-sustaining. For FS4, the non-carbon benefits were not quantified. However, it is safe to assume so, as this is a support mechanism to private sector investments. For FS1, a cost/benefit analysis was conducted, which indicates small net costs / positive marginal abatement costs. However, this assessment is solely based on changes to labor, fuel and machinery costs and ignores the long-term benefits such as a higher commercial timber volumes. Depending on the interest rate applied, it may be envisaged that this activity at least does not generate any net costs eventually.
- Finally, mitigation activities FS2 and FS3 are depending on ER payments and may cease after the finalization of the ERPA term.

Regarding the combination of individual mitigation activities, the table below presents the non-carbon revenues which are generated by the eight mitigation activities, as stipulated by the financing plan.

The investments into the mitigation activities amount to 43.7 million USD over the first 5 years (65.25 million USD over 10 years) and are expected to generate non-carbon income in the amount of 50.1 million USD (240.87 million USD over 10 years).

The assumption is that the underlying strategy of the financing plan will facilitate alternative income, specifically for the local population, which would be substantially higher than the current income. Consequently, it is our understanding that the activities (if they are implemented successfully) will assure the sustainability of ERs and may also continue to generate future, additional ERs, even though not required by Indicator 18.2 of the MF.

NON-CARBON REVENUES											
Key activities	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**TOTAL**
AS1. Agroforestry and improvement of cultivation techniques	-	1,375,294	3,726,342	5,477,040	8,106,002	11,000,427	12,839,378	15,550,735	18,362,646	23,360,715	99,798,579
AS2. Perennial crops development in non-forest areas	-	1,260,000	2,520,000	2,940,000	4,011,978	5,338,466	5,197,480	5,806,980	8,182,347	10,704,201	45,961,452
ES1. Assisted natural regeneration for charcoal production.	-	-	3,420,000	6,840,000	8,748,000	12,564,000	15,240,000	14,868,000	9,168,000	15,702,000	86,550,000
ES2. Afforestation/Reforestation for charcoal production	-	-	315,000	630,000	735,000	945,000	1,050,000	1,513,000	1,436,000	1,931,000	8,555,000
FS1. Reduced impact logging	-	-	-	-	-	-	-		-	-	0
FS2. Conservation of local community forests	-	-	-	-	-	-	-	-	-	-	0
FS3. Conservation concession	-	-	-	-	-	-	-		-	-	0
FS4. Afforestation/Reforestation for lumber production	-	-	-	-	-	-	-	-	-	-	0
TOTAL	**0**	**2,635,294**	**9,981,342**	**15,887,040**	**21,600,980**	**29,847,893**	**34,326,858**	**37,738,715**	**37,148,993**	**51,697,916**	**240,865,031**

11.3 REVERSAL MANAGEMENT MECHANISM

Selection of Reversal management mechanism

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

For option 1, explanation of Reversal management mechanism

DRC will use its own national REDD+ Registry to track and monitor all the ERs generated and transferred by the program in a transparent, efficient, environmental integrity, and accountable manner. It will provide regular information about issuances, transfers and sales of ER units. (see Section 18.2)

To manage permanence risks, DRC will open a reversal buffer account in its National Registry. The ER Program will set aside 20% of the total ERs generated by the ER-Program as a reversal buffer according to the program's risk assessment (see Section 11.1).

For each ER transaction of the ER-Program, DRC will transfer the required ER amount as a set aside for reversal risk management to the reversal buffer account of its national registry or the respective reversal buffer mechanism of the ER buyer. Regarding ER transactions with the Carbon Fund, DRC could transfer the respective ER amount to account for reversal risks to the Carbon Fund buffer mechanism.

Regarding the conversion of ERs into VCUs for selling them on the carbon market, DRC could transfer the respective amount of ER units to the VCS Registry and its reversal management mechanism.

11.4 MONITORING AND REPORTING OF MAJOR EMISSIONS THAT COULD LEAD TO REVERSALS OF ERS

The ER program's monitoring approach will account for deforestation and forest degradation, including major forest losses. This system will allow covering any medium and large-scale reversal due to pests, diseases, forest fires and other potential (natural or anthropogenic) hazards.

As part of its monitoring processes, the ER program will conduct an analysis of Global Forest Watch data. This is an automated process, which covers all strata and will be conducted on weekly basis (cp. Section 9.2). This will allow to pre-identify potential reversals. Following this procedure, the ER program will notify the Carbon Fund on any potential reversals within 90 calendar days after the identification of a potential reversal.

12. UNCERTAINTIES OF THE CALCULATION OF EMISSION REDUCTIONS

12.1 IDENTIFICATION AND ASSESSMENT OF SOURCES OF UNCERTAINTY

This section summarizes the ER Program's approach to identify, minimize and quantify uncertainty following the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Chapter 3) and the FCPF Methodological Framework.

According to the MF, the ER Program is requested to follow a stepwise process for addressing uncertainty related to the REL (and MRV):

1. Identify and assess sources of uncertainty
2. Minimize uncertainty where feasible and cost effective
3. Quantify remaining uncertainty

As explained in Section 8.3.1, the methodology used to estimate average annual GHG emissions in the reference period is based on the provisions of the 2006 IPCC GL, which is equivalent to the Activity Data x Emission Factor (AD x EF) method indicated in Chapter 3.2.3 of the GFOI MGD 2[68] as shown in Chapter 8.3.1 of the ER-PD. Since the multiplication does not have uncertainty by itself, uncertainties may be grouped in uncertainties linked to the Activity Data (AD) and uncertainties linked to the Emission/Removal Factors (EF).

SOURCES OF UNCERTAINTY OF ACTIVITY DATA

Identification of sources of uncertainty

Activity data uncertainties stem from uncertainties associated with land cover classification of each sample for individual epochs for the historical reference period. Per the GOFC-GOLD REDD Sourcebook, possible sources of uncertainty could be quality of satellite imagery, interoperability of different sensors, image processing, cartographic and thematic standards, location and co-registration, the image interpretation procedure, and the post-processing. Since sampling has been used for deriving AD, sampling uncertainty is also required to be included, along with satellite image quality, interoperability of the different sensors, cartographic and thematic standards, location and co-registration, interpreting procedure and post-processing.

[68] GFOI (in press). Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests: Methods and Guidance from the Global Forest Observations Initiative – Version 2. Chapter 3.2.3

- **Quality of the satellite data**: satellite imagery used is Landsat ETM+ and Landsat 8, which are suitable for land cover interpretation and land cover change interpretation in terms of spatial, spectral and temporal resolution[69]. However, there are two sources of error related to the data availability. Imagery for epochs 2004, 2006, 2008, 2010 and 2012 are sourced from Landsat 7 ETM+ which in April 2003 lost its Scan Line Corrector (SLC) comprising data quality in the form of data gaps outside of the central portion of each image bands. Moreover, the tropical rainforest ecoregion is characterized by its high and persistent cloud cover, so shadows and cloud coverage also comprises quality as it generates data gaps. Considering these two sources the data gaps would range from 9% (2014) to 31% (2008), which are high, however, the multiple epochs enables the filling of these gaps leaving only 1.05% of the total sampling units without interpretation of Land Cover change (i.e. no data or only one observation of land-cover), so this source of error is negligible.

Item	2004	2006	2008	2010	2012	2014
Not classified	7	13	19	3	5	4
Cloud / shadow	1,493	3,116	4,553	3,497	3,704	3,164
No image	7,230	7,441	6,815	7,264	6,827	19
Other / image error						
Total non-classifiable	**8,921**	**10,570**	**11,387**	**10,764**	**10,539**	**3,187**
Total points	**37,184**	**37,184**	**37,184**	**37,184**	**37,184**	**37,184**
% of non-classifiable points	**24%**	**28%**	**31%**	**29%**	**28%**	**9%**

- **Interoperability of the different sensors:** although two different sensors are used (Landsat 7 ETM+ and Landsat 8 OLI), these have similar spatial and spectral resolutions. The main difference is the higher quality in Landsat 8 OLI due to its high signal-to-noise ration which is three times higher than Landsat ETM+ and the different spectral resolutions as Landsat 8 OLI contain additional bands and the SWIR and NIR do not have the same spectral range as Landsat 7 ETM+. Since interpretation and classification is fully manual, no automatic or semi-automatic classification (i.e. classifiers might not give consistent results), the different quality and spectral resolutions are not an issue in this case.
- **Cartographic and thematic standards**: interpretation of each sampling point is done by trained interpreters who follow Standard Operating Procedures (SOPs) which provide a classification system with clear definitions and non-overlapping classes. For more details see Annex 6 and Annex 8 on the 'analyst program' and analyst training manual. Interpretation is done at a pixel level (MMU of 0.09 ham), but contextual information within a 60-meter radius from each sample point is used to help the classification,[70] which is an improvement over automatic or semi-automatic classification. Therefore, this source of error is negligible.

[69] GOFC-GOLD. (2015). REDD Sourcebook. 2.7.3.1.1 Sources of uncertainty.

[70] WWC (2015). Analyst Training Manual. Version 1.9.

- **Location and co-registration**: Landsat imagery is co-registered with a geo-location accuracy < 1 pixel which a good practice as defined in the GOFC-GOLD REDD Sourcebook.[71] Therefore, this source of error would not be.
- **Interpreting procedure**: this is the most relevant and important source of uncertainty. Although SOPs were in place and training was implemented to ensure a consistent classification, DIAF's and OSFAC's accuracy assessment or consistency assessment have shown inconsistency in the classifications. Forest and non-forest user's accuracy for the 2014 classification is 0.90 and 0.89 respectively, which is acceptable for wall-to-wall mapping but in the case of manual interpretation and classification, which is considered to be reference data, is high. Moreover, the same results show a user's accuracy in the cropland of 0.54 (0.71 assuming that confusion with non-forest classes is acceptable) for 2014.
- **Post-processing**: once the classification data per sampling point is generated, this has been transferred to an excel spreadsheet where the land cover classification data across epochs is integrated to produce the land cover transition data per point. As explained in chapter 8.3, these profiles are classified individually to determine to assign it to a certain source (i.e. deforestation, degradation, enhancement of carbon stocks in forests, enhancement of carbon stocks in new forests). This reclassification has been done following standardized procedures and classification rules (QC) and it has been repeated by at least two operators (QA) to ensure the quality in the classification. Therefore, this source of error is not important.
- **Sampling error**: after the interpretation procedure, this is the largest source of error. This source has two different components: a) spatial sampling and inference; b) temporal sampling and inference. The former would be relevant, yet it is deemed that with more than 37000 points the sampling error should be negligible. The latter is relevant as different points have a different temporal sampling intensity, so points would have a different probability of selection based on the data availability, which should be considered in the inference. In the latter, it is expected that this will lead to conservative estimates as the overall likelihood of observing deforestation or degradation (which exceed removals) would be reduced.

Assessment of contribution of sources of uncertainty

As indicated above, the main sources of uncertainty would be:

1) **Error due to interpreting procedures;**
2) **Sampling error.**

These two sources can generate systematic and random errors, being the former controlled by standard operation procedures (as required by indicator 8.1 of the methodological framework of the FCPF) and the latter partially compensated or reduced through an increased sampling. These uncertainties cannot be classified individually, but the aggregated of these two uncertainties can be directly estimated through an ad-hoc accuracy assessment and adjustment of areas.

An accuracy assessment following the best practices as described in Olofsson et al. (2014) will enable to estimate the adjusted areas (i.e. bias corrected considering the commission and omission classification errors) which would address the source of error due to "interpreting procedures", and estimate

[71] GOFC-GOLD (2015). REDD Sourcebook. Section 2.1.2.2

associated confidence intervals which eliminates the "sampling error" as the sampling error of the adjusted areas are determined following classic equations of estimation of variance from stratified estimators of discrete variables (Cochran, 1977[72]).

Steps to minimize uncertainty

As indicated above, uncertainties have been minimized through the application of QC/QA measures recommended by the chapter 3 – volume 1 of the 2006 IPCC GL. An example of these measures are QC procedures such as the implementation of SOPs and training procedures, and QA procedures such as consistency checks conducted by interpreters not involved in the original classification.

Following the provisions on verification provided in Chapter 3 – Volume 1 of the 2006 IPCC GL, QA/QC measures will be complemented with verification via an accuracy assessment will be conducted by a third party and which will serve to confirm the acceptable quality of the estimates and will enable to correct biases and respective uncertainties.

SOURCES OF UNCERTAINTY OF EMISSION / REMOVAL FACTORS

Identification of sources of uncertainty

Emission and Removal factors are calculated as the difference between two average estimates of carbon density as shown in Chapter 8.3.1 (i.e. tC/ha in the initial land use and the final land use category), therefore the uncertainty of EFs are directly related to the uncertainty of the average estimates of carbon density of the different land use categories considered. Per Cunia (1987)[73] carbon densities depend on three sources of errors: the measurement errors (biometric variables such as DBH, Total height or basic densities, for instance), the prediction error of the allometric model used (i.e. uncertainty of the model parameters), and the sampling error (i.e. sampling design, spatial heterogeneity of the forest). However, more recent research such as Picard et al. (2015)[74], Van Breugel et al. (2011)[75] and Chave et al. (2004) add an additional uncertainty which is due to the selection of the allometric model (i.e. different models have different predictions). In the framework of the current RL estimation, carbon densities have been estimated from a wall-to-wall biomass map which has been calibrated using LiDAR RS sampling units calibrated in turn by in-situ plots. This adds additional sources of uncertainty to the above list: LiDAR model error (i.e. prediction error), geolocation error and the spatial model error (i.e. prediction error). Additionally, since only a fraction of the pixels of the biomass map have been used, there could be an additional error due to the sampling of these pixels. These will be discussed separately following the uncertainty chain from in-situ measurement to final inference.

- **In-situ plots:**

[72] Cochran, W. G. (1977). Sampling techniques (3rd ed.). New York: John Wiley & Sons.

[73]Cunia, T. 1987. Error of forest inventory estimates: its main components. *In* E.H. Whraton& T. Cunia, eds., *Estimating tree biomass regressions and their error. Proceedings of the workshop on tree biomass regression functions and their contribution to the error offorest inventory estimates, May 26–30, 1986, Syracuse, N.Y. – Part E*. Broomall, PA, USA,USDA Forest Service, Northeastern Forest Experiment Station, General Technical Reportno. NE-117, pp. 1–14. 34, 39, 46, 184

[74] Picard et al. 2015. Error in the estimation of emission factors for forest degradation in central Africa. Introduction.

[75]Van Breugel et al. (2011) - Estimating carbon stock in secondary forests Decisions and uncertainties associated with allometric biomass models

- **Measurement errors**: measurement errors are the errors of the predictors of the allometric model. DBH measurement error may be systematic or random. The former is assumed to be negligible since measurements of DBH were done by experimental cruisers following SOPs, while the latter may occur due to random errors which propagate a give a zero bias. Picard et al. (2015) assumed in its analysis of uncertainties for emission factors assumed this error to be a 2%. Total tree height is another predictor which is measured and whose error is assumed to be random (we assume there are no systematic errors). Chave et al. (2004) measured 1000 trees and estimated tree height to be c.a 10% of the estimated value. Finally, another predictor which is commonly used in allometric equations is the Wood Specific Gravity (WGS). Since this predictor cannot be measured, usually it is sourced from research studies and global databases. Chave et al. (2004) assumed that the error of this predictor was 10% of the estimated values. Chave et al. (2004) also found that the propagated error of these three predictors was 16.5% of total tree biomass. However, as indicated by this study, errors at the tree level would be averaged and cancelled at the stand level. However, Picard et al. (2015), considering only the DBH measurement error, concluded that this error was negligible with respect to the other sources of error.
- **Allometric model error**: the allometric model error can be divided in the following sources: a) the error due to the uncertainty of the model's coefficients; b) error linked to the residual model error; c) the selection of the allometric model. Per Picard et al. (2015) the largest uncertainty is due to the selection of the allometric model which may be 77% of the average estimate. Van Breugel et al. (2011) estimated that the errors linked to the allometric equation could vary from 5 and 35% depending on the model selected. Regarding the first and second errors, these are expected to be negligible as the parameter's uncertainty and the residual model error of Chave et al. (2014) are very low. Therefore, it is expected that the main source of error will be the selection of the allometric equation, which is relevant.
- **Sampling error**: sampling error must be added to the measurement and prediction errors mentioned above; this one is used to perform the inference to estimate the biomass/carbon at the level of the area of interest. This error depends[76]of: a) the sampling design; b) the size of the sampling; c) the type of estimator used; d) the variability inherent between the sampling units. However, some of these errors may not be applicable when the in-situ plots are not used for inference, but to calibrate models relying on auxiliary information such as remote sensing data. In this cases the relevant sources are errors due to the local spatial variability and errors due to the representative of the plots. In this case, Rejou-Mechain et al. (2014)[77] indicates that for in-situ plots of 1 ha and footprint are larger than 1 ha, the error due to local spatial variability is 4.6% of aboveground biomass in the case of a linear model. In terms of representative of the plots, under the framework of the current RL, in-situ plots used to calibrate the plots were sourced from Bastin et al. (2015)[78], which were 1 ha in size and cover a range of forest types, however, they were concentrated in space so they might not represent the full variability.

- **Remote sensing plots:**

[76]Introducción - Cunia, T. 1987.

[77] Rejou-Mechain et al. 2014. Local spatial structure of forest biomass and its consequences for remote sensing of carbon stocks.

[78]Bastin et al. (2015). Seeing Central African foreststhrough their largest trees.

- **Measurement errors:** according to Saatchi et al. (2015)[79] the LiDAR height measurement at 2 m spatial resolution derived from more than 8 points of LiDAR measurements has height error <1m. This measurement error at 100 m resolution will have an error of less than 1/50 m so it is negligible when propagated. Therefore, this error is negligible.
- **Geolocation error:** geolocation error is due to the lack of co-registration between the in-situ plot and the remote sensing footprint. In-situ plots of 1 ha were used while the GPS error is less than 15 m, so this error is negligible.
- **Model error**: model error is linked LiDAR height to biomass model or allometry is a power law function derived from the relating LiDAR height metric to ground estimated biomass. The fit of the power law has some errors associated with it which are similar to the errors indicated for allometric equations above: error due to uncertainty in the equation parameters; error due to the residual model error. The selection of model is not relevant as the best model is calibrated ad-hoc.
- **Sampling error:** sampling error is associated with representativeness of LiDAR height samples for the forest types. More than 75000 ha of LiDAR samples was collected which represents a very high sampling intensity randomly located in space to cover the maximum of the variability. Therefore, this error is considered to be negligible.

- **Wall-to-wall biomass mapping:**
  - **Measurement errors**: measurement errors associated to the covariates used by the regressor used to predict biomass at the pixel level. Within the framework of the RL covariates are sourced from different bands from Landsat sensors and the HV band of ALOS PALSAR. These are assumed to be exact, so this measurement error may be considered negligible.
  - **Model error:** errors in this case would be the model errors of the regressor used to predict the variable of interest at the pixel level. The sources of error are like the ones indicated in the previous groups. However, within the framework of the present ER program, no parametric methods were used.
  - **Auto-correlation error**: when averaging pixel values across a large area, random errors might cancel each other and estimates would be accurate. However, as indicated by Baccini et al. (2012)[80], ignoring the spatial-correlation of errors, for example by simply summing the pixel values, would result in the underestimation of the aggregated uncertainty.
- **Sampling of the wall-to-wall biomass map**:
  - **Sampling error**: as explained in Chapter 8.3, to match the classification system used in the calculation of activity data areas and that of emission factors, samples from 2014 were overlaid on the biomass map. We expected an error due to the sampling of the biomass map which could be either random or systematic. This sampling error has been estimated at about 4.7%, and included in the overall uncertainty calculation.

Steps to minimize uncertainty

The following steps will be taken to minimize uncertainty:

[79]S. Saatchi, V. Meyer, A. Xu, A. Ferraz, Y. Yan, A. Fricker. 2015. PROJECT « CARBON MAP AND MODEL (CM&M)» - Mai Ndombe Biomass Map.

[80]Baccini et al. (2012). Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. Supplement material.

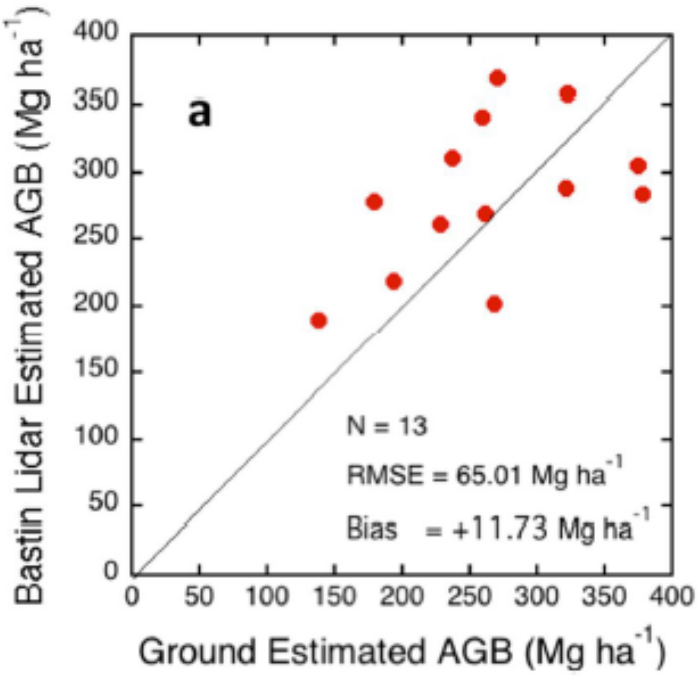
- **In-situ plots**: The World Bank is currently executing a project lead by COMIFAC to conduct destructive sampling of trees in different forest ecosystems of the Congo Basin. This project is expected to be finalized end of 2016 and will enable the validation of different equations available, or generate hybrid models which combine multiple equations.
- **Remote sensing plots**: one of the identified issues was that the Bastin plots were concentrated in space. Additional 11 in-situ plots were collected which will be used for calibration purposes and improve the model. This improvement will be implemented in June 2016 and it will serve to revise the emission factors.
- **Sampling of the wall-to-wall biomass map**: the current estimate for carbon densities is based on a simple average. The use of a stratified estimator provides more accurate estimates, and will be implemented in July, 2016.

Assessment of contribution of sources of uncertainty

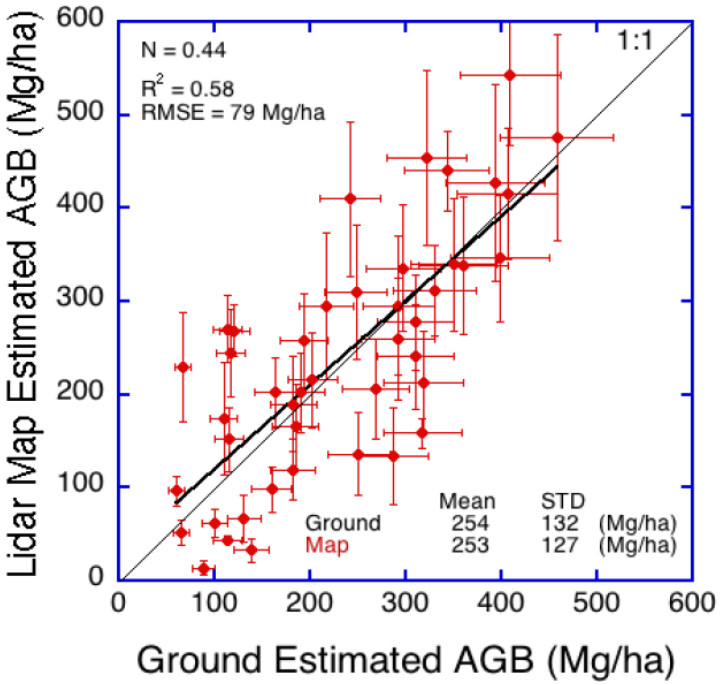
As explained above, the main sources of uncertainty which are significant for the estimation of EF are:

- **In-situ plots**:
  - **Measurement error**: random errors linked to the measurement of predictors. This could be 10-16% in total, yet it is expected that this error will be compensated to a certain extent as these are random errors.
  - **Allometric model error**: the main source is the selection of allometric equation. However, under the framework of the current RL estimation this error is assumed to be zero as there is only one reliable equation available, Chave et al. (2014). Therefore, this may be assumed to be zero.
  - **Sampling error**: this error would be reduced due to the size of the in-situ plots. However, these may not be representative of the full range of the main predictors of the biomass spatial model. This error will be explained below under the model error of remote sensing plots.
- **Remote sensing plots**
  - **Model error**: the graph below is sourced from Saatchi et al. (2016)[81] and it compares the prediction of the LiDAR model against the estimation in 13 in-situ plots which were not used to calibrate the model. The bias is 11.73 t d.m./ha showing that the LiDAR model underestimates in average aboveground biomass, while the RMSE is 65.01 t d.m./ha. This is equal to a margin of error at 90% level of 32.6 t d.m./ha which is a 11% of the average estimate given by the LiDAR model.

[81] S. Saatchi, V. Meyer, A. Xu, A. Ferraz, Y. Yan, A. Fricker. 2016. PROJECT « CARBON MAP AND MODEL (CM&M)» - Mai Ndombe Biomass Map – validation of biomass map.



- **Wall-to-wall biomass mapping:**
  - **Model Error**: Saatchi et al. (2015) compare the map estimates with in-situ plots throughout DRC, and confirmed a RMSE of 79 t d.m./ha, which is equivalent to a 8% of relative margin of error in average. This accounts for the previous error too as the below comparison is made between plots and map estimates.



- **Sampling error**: Since the sampling of the biomass map was altered (only use of stable samples with at least 3 consistent classifications) the sampling error increased compared to the previous uncertainty assessment. The sampling error ranges 0.8% for primary forest, 5.1% for secondary forest and 5.4% for Non-forest.

12.2 QUANTIFICATION OF UNCERTAINTY IN REFERENCE LEVEL SETTING

Where uncertainty could not be reduced to zero, or close to zero (e.g. by applying conservative values), we quantified uncertainty for all activity data and emission factors. We used the 'simple error propagation' method (IPCC 2006), calculating uncertainties in all activity data and emission factors before aggregating them to estimate average annual GHG emissions. Per IPCC (2006), to quantify uncertainty using the simple propagation of error method, estimates of the mean and the standard deviation for each input are required, as well as the equation through which all inputs are combined to estimate an output. The following approach was applied:

- Where the mean, standard deviation and sample size was available, we calculated the 90% confidence interval. Where they were not available, we followed the guidance provided by the IPCC (2006) and use expert judgment to directly derive a confidence interval (relative).
- In all cases, we assumed the confidence interval was symmetrical.

Uncertainty was then calculated using the formulas from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (i.e. equations 3.1 and 3.2).

The uncertainty of emission reductions will be calculated using Monte Carlo simulations. Although this is not currently implemented, this section provides a methodology that will be followed.

The uncertainty analysis of the REL was carried out jointly by OSFAC, WWC and GFA. It is based on two separate uncertainty estimations: One related to the change detection of the sampling approach for activity data calculation and the other for emission factors.

CALCULATION OF UNCERTAINTY OF ACTIVITY DATA

An accuracy assessment of the activity data was conducted in order to provide an unbiased estimate of the areas of change, the uncertainty of the areal estimates and to provide information to validate the methodology for detecting forest degradation. Detailed results from the activity data accuracy assessment include:

- Estimates for the five activity data land cover change classes, using a double-sampling estimator for stratification: (primary deforestation, secondary deforestation, degradation, primary forest regrowth and secondary forest regrowth) over the historical reference period.
- Confidence intervals of the activity data to calculate the overall uncertainty of the historical deforestation, degradation and regrowth area.
- A validation of the methodology for quantifying forest degradation. Estimates for the first objective explained above provide a means to validate this methodology, and an error matrix and associated accuracy measures were also estimated to provide additional accuracy detail.

The accuracy assessment was implemented by OSFAC, the detailed methodology for which may be found in Annex 17. Results are summarized in following tables.

Table 44: Error Matrix for the Activity Data Accuracy Assessment. Column labels represent the reference classification whereas Row labels represent the original REL classification.

		Reference samples							
	Class	**DEG**	**STABLE**	**SREG**	**PREG**	**PDEF**	**SDEF**	**Total**	**User´s accuracy**
Original REL samples	**DEG**	0.039	0.150	0.001	0.002	0.001	0.002	**0.20**	**0.20**
	STABLE	0.007	0.563	0.004	0.001	0.003	0.009	**0.59**	**0.96**
	SREG	0.000	0.023	0.005	0.000	0.000	0.002	**0.03**	**0.17**
	PREG	0.004	0.091	0.000	0.000	0.001	0.000	**0.10**	**0.00**
	PDEF	0.001	0.024	0.000	0.001	0.004	0.004	**0.03**	**0.12**
	SDEF	0.001	0.028	0.002	0.000	0.008	0.019	**0.06**	**0.34**
	Total	**0.05**	**0.88**	**0.01**	**0.00**	**0.02**	**0.04**	**1.00**	
	Producer´s accuracy	**0.75**	**0.64**	**0.43**	**0.00**	**0.23**	**0.54**		
	Overall Accuracy							**0.63**	

Table 45: Sample proportion and variance

	DEG	**STABLE**	**SREG**	**PREG**	**PDEF**	**SDEF**
p sample proportion	0.052	0.879	0.012	0.003	0.018	0.036
Variance	0.000	0.000	0.000	0.000	0.000	0.000

Table 46: Adjusted areas and confidence intervals

Class	**Proportion**	**Adjusted areas (ha)**	**Relative error at 90% level of significance (ha)**	**Relative error at 90% level of significance (%)**	**Confidence interval 90% (ha)**
DEG	0.05	645,365	112,416.0	17.4%	532949 - 757781
STABLE	0.88	10,884,799	149,610.8	1.4%	10735189 - 11034410
SREG	0.01	150,404	48,848.4	32.5%	101556 - 199252
PREG	0.00	43,185	30,209.0	70.0%	12976 - 73394
PDEF	0.02	218,385	57,179.6	26.2%	161205 - 275564
SDEF	0.04	442,261	81,914.0	18.5%	360347 - 524175

CALCULATION OF UNCERTAINTY RELATED TO EMISSION FACTORS

The Methodological Framework of the FCPF Carbon Fund does not clearly indicate what errors must be considered in the assessment of the accuracy of the emission factors. IPCC 2006 guidelines, on the other hand, contain a description of good practices in the calculation and consideration of the uncertainties, but do not include either a clear requirement of what sources of uncertainties should be considered.

As mentioned above, the aggregate or propagation of uncertainties was done by following Method 1 of the IPCC guidelines. In this case, the estimate of uncertainties was made by following the IPCC guidelines (Chapter 2, Volume 1 of IPCC GL 2006). The uncertainties described in the different publications or determined from the different data sources, and in case of the combination of values from different sources, the error spread was made following Method 1 of the IPCC guidelines for the spreading of uncertainties. This means, in the case of a sum of two parameters$x$and$y$, it was considered that their uncertainties σx y σywould be combined with the root of the sum of the squares:

Uncertainty (x+y) = $\sqrt{\sigma_x + \sigma_y}$.

In case of a multiplication of parameters$x$and$y$, it was considered that their uncertaintiesσ_xy σ_y, would be combined with the following equation:

Uncertainty (xx y) = $\sqrt{\left[\frac{\partial f}{\partial x}\sigma_x\right] + \left[\frac{\partial f}{\partial y}\sigma_y\right]}$

These equations are equivalent to those indicated in Chapter 2 of Volume 1 of IPCC GL 2006.

The following Table 47 provides (component) uncertainty estimates related to above and below-ground biomass estimation.

Table 47: Component and aggregated uncertainty of the stratified biomass estimates

Stratum	Land cover class	Mean biomass map AGB error [%][82]	Map sampling error [%]	AGB allometry error [%]	BGB error [%]	Total error AGB [%]	AGB+BGB error [%]	Areal proportion of stratum	AGB+BGB stratified estimator [tdm/ha]	Stratified AGB+BGB error [tdm]	Stratified AGB+BGB error [%]
MIX	Dense Forest	13.87%	1.46%	10%	35.03%	17.16%	15.41%	6%	376.88	+/- 53.99	+/- 14.32%
NFC		12.08%	0.65%	10%	35.30%	15.70%	14.38%	8%			
NFE		12.65%	0.64%	10%	35.24%	16.14%	14.69%	15%			
PFC		11.53%	0.89%	10%	35.30%	15.29%	14.09%	38%			
PFE		11.89%	0.47%	10%	35.25%	15.54%	14.26%	28%			
SEC		12.23%	1.29%	10%	35.31%	15.85%	14.49%	5%			
MIX	Secondary Forest	31.01%	4.40%	10%	24.70%	32.88%	27.29%	34%	192.88	+/- 41.48	+/- 21.51%
NFC		21.16%	10.36%	10%	33.22%	25.59%	21.69%	2%			
NFE		20.23%	5.91%	10%	32.73%	23.33%	19.93%	11%			
PFC		13.53%	6.25%	10%	35.00%	17.95%	15.98%	13%			
PFE		22.74%	4.39%	10%	31.41%	25.23%	21.35%	20%			
SEC		26.61%	5.53%	10%	28.20%	28.96%	24.22%	19%			
MIX	Non-Forest	40.58%	3.40%	10%	13.16%	41.93%	30.19%	67%	25.25	+/- 7.51	+/- 29.73%
NFC		33.09%	18.97%	10%	13.16%	39.43%	28.41%	2%			
NFE		40.87%	7.89%	10%	13.16%	42.81%	30.81%	19%			
PFC		50.00%	11.42%	10%	13.16%	52.25%	37.51%	0%			
PFE		34.03%	10.66%	10%	13.16%	37.04%	26.72%	6%			
SEC		39.00%	10.12%	10%	13.16%	41.51%	29.89%	7%			
Sources		Saatchi et al. 2015 /2016	Calculated	Chave 2014	Mokany et al. 2006	Error propagation	Error propagation				

[82] This aggregated error includes the ground measurement error, geolocation error, Lidar height to biomass model error and the biomass prediction model error

Based on the stratified biomass uncertainties, uncertainties for the stratified emission factors were then calculated (see Table 48)

Table 48: Uncertainties of the stratified emission and removal factors

Sources / Sinks	Emission / removal factor	Uncertainty of emission / removal factor	Unit	Relative uncertainty of emission / removal factor
Deforestation (PN)	605.98	+/- 93.93	tCO2/ha	+/- 15.50%
Secondary deforestation (SN)	288.88	+/- 72.64	tCO2/ha	+/- 25.15%
Degradation (PS)	317.09	+/- 117.33	tCO2/ha	+/- 37.00%
Primary regrowth (Y)	-15.85	+/- 5.87	tCO2/ha/year	+/- 37.00%
Secondary regrowth (X)	-14.44	+/- 3.63	tCO2/ha/year	+/- 25.15%

Based on these, the uncertainties of each of the land cover change transition profiles (e.g. PN, PNX, PNXX) were determined.

CALCULATION OF UNCERTAINTY RELATED TO REFERENCE LEVEL

Based on uncertainties calculated for activity data and emission factors, the uncertainty of the emissions over the reference period and ultimately, the uncertainty of the reference emission level was calculated using propagation of error. The overall uncertainty of the reference emission level is estimated at +/- 9.2 million tCO2/year or 21.89%.

Table 49: Uncertainty of average emissions and removals over the reference period

Sources / Sinks	Emissions / removals [tCO2/year]	Uncertainty of emissions / removals [tCO2/year]	Relative uncertainty of emissions / removals
Deforestation (PN)	12,751,603	+/-3,879,976	+/- 30.43%
Secondary deforestation (SN)	12,061,756	+/-3,767,007	+/- 31.23%
Degradation (PS)	19,030,762	+/-7,782,713	+/- 40.90%
Primary regrowth (Y)	-308,940	+/-244,482	+/- 79.14%
Secondary regrowth (X)	-1,124,176	+/-461,755	+/- 41.07%
Average emissions over reference period	42,411,005	+/-9,281,966	+/- 21.89%

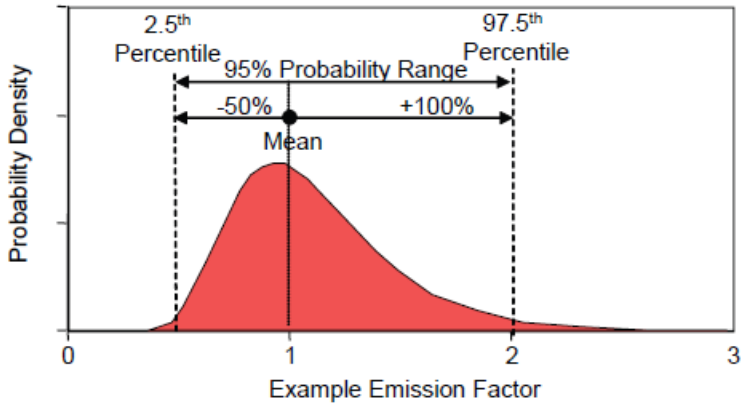
CALCULATION OF UNCERTAINTY RELATED TO EMISSION REDUCTIONS

To comply with the requirements of the MF uncertainty of ER will be calculated following Method 2 (Monte Carlo simulation) and estimated as a 90% confidence level two-tail interval.

The following steps will be followed:

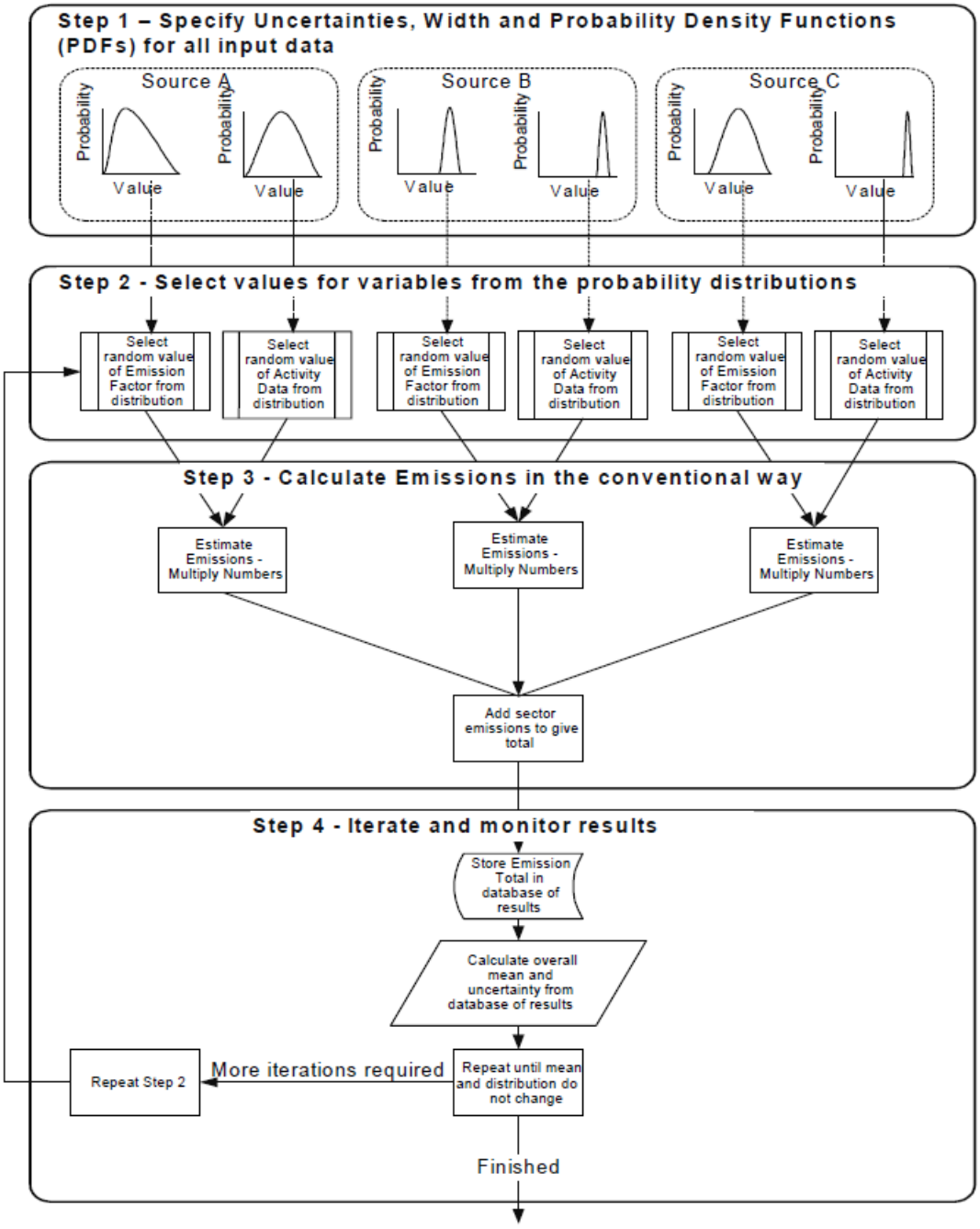
1. **Estimation of uncertainty of AD**: Adjusted areas and respective confidence intervals are used. We assume these errors follow a normal centered distribution, where the average represents the adjusted areas and the standard deviation can be estimated from the confidence intervals.
2. **Estimation of uncertainties of EFs**: Errors will be propagated using Monte Carlo simulations or following Method 1 propagation of uncertainties. In the latter, it will be assumed a normal centered distribution estimating the standard deviation from the confidence interval of the estimate.
3. **Generation of random values**: Realizations of the above distributions will be draw and they will be multiplied for each stratum and land cover class to estimate emissions. 10,000 realizations will be drawn.
4. **Estimation of ER**: The same procedure will be followed for monitored GHG emissions. These will be subtracted in each of the 10,000 realizations.

Figure 17. Example of calculation of confidence intervals using percentiles of a probability density function.



5. **Estimation of uncertainties**: Using the 10,000 realizations of ERs the 95% percentile (p_{95}) and 5% percentile (p_5) will be estimated using the following equation:$U_{Lower} = \frac{p_5 - \bar{x}}{\bar{x}} 100$; $U_{Upper} = \frac{p_{95} - \bar{x}}{\bar{x}} 100$

Figure 18. Simulation process per 2006 IPCC GL



The final estimate of uncertainty will be used to determine the correction factor, which will be used to estimate the number of ERs that are available.

Incertitude aggregate of Emission Reduction	Adjustment Factor
= 15%	0%
> 15% and = 30%	4%
> 30 and = 60%	8%
> 60 and =100%	12%
> 100%	15%

The adjustment uses the following this formula:

$$ER_{PROGRAM,i} = \left(E_{RL,i} - E_{program,i}\right) \times (100 - CF\ )/100$$

Where:

$ER_{PROGRAM,i}$ Emission reductions generated by activity i; $tCO_2 year^{-1}$.

$E_{RL,i}$ Reference level of REDD+ activity*i*; $tCO_2 year^{-1}$.

$E_{PROGRAMA,i}$ Emissions generated by activity *i* in the program scenario; $tCO_2 year^{-1}$.

CF Adjustment factor; percentage

13. CALCULATION OF EMISSION REDUCTIONS

13.1 EX-ANTE ESTIMATION OF THE EMISSION REDUCTIONS

The Emission Reduction potential of this ER-Program have been estimated based on the existing strategy and current funding level. Different methods have been used to estimate the potential ER depending of the activities implemented by the program.

Emission Reduction have been calculated differently for 3 sets of activities:

- **Reduced-impact logging** (FS1). This refers to the reduction of deforestation and degradation generated by forest companies engaged in reduced-impact logging.
- **Conservation**. This refers to the expected impact of both conservation of local community forests (FS2) and conversion of concession into conservation concession (FS3) on reduction of deforestation and degradation.
- **Plantation.** This concerns the direct effect of plantation (AS1, AS2, ES1, ES2 and FS4) on Carbon sequestration but also their indirect effect on the reduction of deforestation and degradation.

For each of these activities, Emission Reduction Potential has been calculated using the **implementation level of each activity**. These levels are established based on existing up-front funding and envisaged redistribution of carbon revenues (for Year 5-10 period)

ER potential from Reduced-Impact Logging activities

Estimation of the baseline Emission generated by planned logging practices during the program period has been established using the data collected from Forest companies and Administration and existing Forest management plans. This estimation give an average of 180 00 tCO2/year/concession (FRM, 2015). A reduction of the baseline emission of 30% has been considered to estimate the impact of Reduced-impact logging practices on deforestation and degradation (Schmidt, 2014).

The estimation of the number of concessions engaged in Reduced impact logging is based on substantiated expressions of interests from forest management companies to partner with the ER Program. It is expected, that a successful implementation under the first years may create additional momentum.

Table 51 presents the estimation of concessions involved in Reduced-impact logging activities, the representative areas and the potential annual Emission Reduction.

Table 51: Potential Emission Reduction of Reduced-impact logging activities				
Years	**Number of concessions**	**Area under Reduced-impact logging (ha)**	**Total exploitation zone (ha)**	**Potential Emission Reduction (tCO2/year)**
2016	1	3 457	86 425	-
2017	2	6 914	172 850	54 000
2018	3	10 371	259 275	108 000
2019	3	10 371	259 275	162 000
2020	3	10 371	259 275	162 000
2021	5	17 285	432 125	162 000
2022	5	17 285	432 125	270 000
2023	7	24 199	604 975	270 000
2024	7	24 199	604 975	378 000
2025	7	24 199	604 975	378 000
2026	10	34 570	864 250	378 000
			Total 5 years	**648 000,00**
			Total 10 years	**2 322 000,00**

ER Potential from Conservation activities

Impact of conservation activities on Emission Reduction have been estimated based on the Reference Emission Level that provide historic deforestation and degradation rate as well as calculated Emission Factors (see Section 8). The following table shows the Emission Reduction potential per area of forests under conservation:

	Def/deg rate (% /total forested area)	**Average emission per area subject to deforestation and degradation [tCO2/ha]**	**Emission Reduction per area under conservation [tCO2/ha]**
Deforestation	0.53%	376	1.99
Degradation	0.52%	295	1.53

The following assumptions have been made about the efficiency of conservation activities to reduce deforestation and degradation.

Efficiency hypothesis	**Deforestation**	**Degradation**
Efficiency of Conservation concession	80%	80%
Efficiency of Conservation of local communities	70%	70%

Table 52 below presents the estimation of potential Emission Reductions for both conservation concessions and areas under conservation by local communities. The plan proposed for conservation concessions is based on the existing ERA/WWC conservation concession and potential new concessions based on existing interests. The expansion plan proposed for conservation of local communities' forests is based on the existing up-front funding and potential reinvestments after Year 5. It is important to note that these estimates are based on assumptions (e.g. emission factors, REL allocation) that will be revisited during the negotiation of benefit sharing with each concessionaire and impacted community.

Table 52: Potential Emission Reduction of conservation activities

Years	Number of conservation concessions	Area under conservation concession	Areas under community conservation	Potential ER from conservation concession (tCO2/year)	Potential ER from community conservation (tCO2/year)
2016	1	248 956	59 250	0	0
2017	2	335 381	118 500	832,561	813,597
2018	2	335 381	245 500	1,052,754	983,211
2019	2	335 381	440 250	1,229,721	1,119,528
2020	2	335 381	683 000	1,501,093	1,328,566
2021	2	335 381	827 000	1,839,351	1,589,125
2022	2	335 381	971 000	2,040,006	1,743,689
2023	3	421 806	1 115 000	2,240,661	1,898,253
2024	3	421 806	1 259 000	2,578,948	2,158,835
2025	3	421 806	1 355 000	2,779,603	2,313,400
2026	3	421 806	1 451 000	2,913,374	2,416,442
			Total 5 years	6,455,481	5,834,027
			Total 10 years	19,008,073	16,364,646

Potential Emission Reduction from Plantation activities

ER potential of plantation are calculated assuming direct effect (Carbon sequestration) but also indirect effect on reduction of deforestation and degradation. Indeed, these plantations create alternative incomes that reduces pressure on existing forests. Moreover, households practicing slash-and-burn have limited workforce and the implementation of plantation might also divert beneficiaries to open new fields in forest.

In order to estimate this indirect emission reduction potential, the following efficiency factors have been used (10% means that for 1 ha of plantation, 0.1 ha of deforestation has been avoided). For this analysis, plantation activities have been distinguished between **agriculture-oriented plantation** as agroforestry and perennial crops development and **wood-oriented plantation** as natural regeneration and reforestation for charcoal production and reforestation for lumber production.

Efficiency hypothesis	Deforestation	Degradation

Efficiency of Wood-oriented plantations (Plantation and regeneration for woodfuel of lumber)	10%	30%
Agriculture-oriented plantations (fruit species, perennial crops)	30%	10%

Sequestration of Carbon has been calculated using annual carbon stock increment for each of the key-activities based on IPCC default values.

Table 53 presents the cumulative number of plantation and potential of sequestration and avoided deforestation and degradation over a 10-years period.

Table 53: Potential Emission Reduction of plantations activities

Years	**Cumulative area of wood-oriented plantation (ha)**	**Cumulative area of agriculture-oriented plantation (ha)**	**Avoided deforestation and degradation(tCO2/year)**	**Carbon sequestration (tCO2/year)**
2016	7 769	2 504	-	-
2017	15 538	4 198	1,482,768	43,191
2018	27 049	6 457	2,802,612	86,259
2019	42 302	9 281	4,707,583	190,333
2020	58 706	12 104	7,197,680	387,565
2021	63 551	13 429	9,832,955	641,335
2022	68 396	14 754	10,710,106	799,759
2023	73 242	16 080	11,587,257	968,013
2024	78 087	17 405	12,464,408	1,057,251
2025	81 780	18 730	13,341,559	1,017,075
2026	85 473	20 055	14,073,532	1,067,857
		Total 5 years	**26,023,599**	**1,348,683**
		Total 10 years	**88,200,462**	**7,377,276**

Summary of ER ex-ante estimation

Table 52 summarizes the gross ER potential for the different set of activities of the ER-Program.

Table 52: ER ex-ante estimation per activities

	Wood-oriented plantation and regeneration	**Agriculture-oriented plantation**	**Community conservation**	**Conservation concession**	**Reduced impact logging**	**Total Gross ER (tCO2/year)**
2017	998,334	527,625	146,158	1,500,000	54,000	3,226,117
2018	1,988,465	900,406	292,316	1,743,650	108,000	5,032,837

2019	3,516,277	1,381,639	605,600	1,743,650	162,000	7,409,166
2020	5,586,191	1,999,054	1,086,010	1,743,650	162,000	10,576,904
2021	7,852,518	2,621,773	1,684,826	1,743,650	162,000	14,064,766
Total	19,941,785	7,430,497	3,814,909	8,474,598	648,000	40,309,789
%	49%	18%	9%	21%	2%	

To estimate potential net Emission Reductions, the following set-asides were determined in line with the findings in Sections 10 to 12:

- The risk- and risk mitigation evaluation results in the **set-aside of 20%** of emission reductions in the risk buffer.
- Finally, the uncertainty analysis indicates that the uncertainty amounts superior to 30% and hence a **set-aside of 8%** (i.e. applicable to overall uncertainties from 30%) applies.

Table 54 below presents ER ex-ante estimation per carbon accounting stratum. **The ER-Program may generate 29 million net emission reductions during the term of the ERPA.**

Table 54: ER ex-ante estimation per carbon accounting units

	Unplanned deforestation	Unplanned degradation	Planned Degradation	Carbon sequestration	Total Gross ER (tCO2/year)	Set-aside of ERs Risks and uncertainty	Net Emission Reduction (tCO2/year)
2017	1,406,518	1,722,408	54,000	43,191	3,226,117	903,313	2,322,805
2018	2,109,400	2,729,178	108,000	86,259	5,032,837	1,409,194	3,623,642
2019	2,973,219	4,083,613	162,000	190,333	7,409,166	2,074,566	5,334,599
2020	4,135,608	5,891,731	162,000	387,565	10,576,904	2,961,533	7,615,371
2021	5,408,149	7,853,281	162,000	641,335	14,064,766	3,938,135	10,126,632
Total	16,032,894	22,280,213	648,000	1,348,683	40,309,789	11,286,741	29,023,048
%	40%	55%	2%	3%			

14. SAFEGUARDS

14.1 DESCRIPTION OF HOW THE ER PROGRAM MEETS THE WORLD BANK SOCIAL AND ENVIRONMENTAL SAFEGUARDS AND PROMOTES AND SUPPORTS THE SAFEGUARDS INCLUDED IN UNFCCC GUIDELINES RELATED TO REDD+.

NATIONAL FRAMEWORK FOR ENVIRONMENTAL AND SOCIAL MANAGEMENT OF REDD+ ACTIVITIES

The Strategic Environmental and Social Assessment (SESA, ref.: SESA Report on the FCPF website) of REDD+ in DRC has been conducted in a very inclusive way, with a very strong participation by civil society, and the other stakeholders involved. The SESA process was conducted throughout 2012 and part of 2013 in parallel with the development of the National REDD+ Strategy Framework. The identification of the seven pillars of the REDD+ Strategy and their activities also resulted from a consultation process. The associated risks identified and respective recommendations have been considered in the design of the strategy. The consultation process is well documented in the SESA report.

Asa result of the SESA process, the **DRC adopted an Environmental and Social Management Framework** (ESMF, ref.: ESMF on the FCPF website) and the following five specific frameworks that address particular risks of REDD+ investments: pests and pesticides management framework, cultural heritage management framework, Indigenous Pygmy Peoples Planning Framework, process framework and resettlement policy framework. These frameworks define the guidelines to be adopted, specific studies that should be conducted, the compensation to be provided, the procedures to allow people to appeal against the proposed activities, the procedures for managing these appeals and the monitoring and evaluation process needed to verify the sound implementation of mitigation measures. It should be noted that the DRC is the first country in the world with environmental and social safeguard instruments on REDD+ duly validated by the World Bank (May 2015).

The DRC has also defined its national social and environmental standards to have its own national regulatory framework and ensure the integration of social and environmental considerations in the implementation of REDD+, in full compliance with the Cancun Agreements and related international regulatory frameworks (ref.: national standards). A broad participatory development and capacity-building effort was undertaken with civil society over an eight-months period. The standards contain 7 principles, 20 criteria, and 20 mandatory framework indicators. They cover participation, governance and transparency as well as the increase and sharing of potential social and economic benefits, mainstreaming of gender issues, the respect and promotion of rights and appeal procedures. These standards have been tested at several pilot sites in the DRC including the Mai Ndombe jurisdiction.

APPLICATION OF SOCIAL AND ENVIRONMENTAL MANAGEMENT IN THE MAI-NDOMBE ER PROGRAM

The ER Program's intervention strategy has been developed in alignment with the National REDD+ Strategy Framework and has considered the recommendations resulting from the SESA process and national ESMF. As a first experience in the application of national instruments of REDD+, the program will test the application of safeguards instruments in the implementation phase of REDD+.

The management of social and environmental aspects of the program is fully integrated into the identification, design, monitoring, and evaluation of its activities. All projects/activities implemented by the program must comply with the requirements of the ESMF at every step of their implementation.

Consideration of safeguards in the identification and design of projects. Projects in the preparation phase must demonstrate that they meet or take adequate steps to meet the national requirements regarding social and environmental standards, in particular regarding governance, accountability, FPIC and monitoring. Each project will be screened using a standardized template and categorized according to associated risks and mitigation potential. Project developers or Local Executing Agencies (LEA) supporting the implementation of community micro-projects will complete the templates. They will then be collected and consolidated by the Program Management Unit and transferred to the REDD+ Executive secretariat through the Registry. Depending on the risks identified, an environmental and social impact assessments may be required and/or the development of environmental and social management plans (ESMP)or other plans, depending on the nature of the risks. The ESMP, prepared by project developers and/or LEA, must be approved by the REDD+ Executive secretariat. For projects with little environmental and social impacts, a guide on good social and environmental practices will be applied.

Monitoring and evaluation of the implementation of safeguard measures. Project developers are subject to compliance with ESMP and others plans if relevant, as well as national social and environmental standards (which are the minimum requirements to be followed). The monitoring of standards and the specific requirements of the ESMP are the basis of the monitoring and evaluation of the proper application of the safeguards.

Now, **the siting of the specific activities of the program has not been determined** so the ER-Program can't propose site-specific safeguards plan. It explains the reason why DRC adopted a framework approach that allows developing safeguards plan according to implementation steps (during site selection, activities design, implementation and monitoring). However, to provide greater precision in terms of impacts, risks and mitigation measures pertinent to the Mai-Ndombe ER-Program, a participatory analysis has been conducted with the relevant stakeholders (see Annex 13).

This analysis has been developed first by a small working group composed of representatives of government and civil society and safeguards experts and has been then presented to a broader group of local stakeholders including representatives from indigenous peoples and local communities during a workshop in Inongo in April 2016. This living document will serve as a tool to define site-specific safeguards plan and will be translated into a monitoring matrix for the program management unit and the provincial REDD+ Steering Committee to follow safeguards application.

14.2 DESCRIPTION OF THE ARRANGEMENTS TO PROVIDE INFORMATION ON SAFEGUARDS DURING THE ER PROGRAM IMPLEMENTATION

The sound application of safeguards as well as the generation of non-carbon benefits[83] during the implementation of the program will be disclosed through the following channels: (i) regular information posted in the National REDD+ Registry (ii) a monitoring report on National Environmental and Social Standards and specific safeguards plan if relevant published annually or bi-annually, and (iii) an independent report produced by civil society and based on independent observation mission. Roles and responsibilities are detailed in Annex 12.

The national REDD+ registry will publicly display the environmental and social impact studies, the environmental and social management plans, and the monitoring of indicators providing information on the proper application of safeguard measures for each project and program in the country. The ER program management unit, working closely with the Local Executing Agencies, will be responsible for uploading the information in the registry. The nested REDD+ projects will also be directly accountable regarding the uploading of information in the registry. Furthermore, the registry will also provide information on complaints and appeals relating to each project and their processing status and the resolution adopted where necessary (see Section 15.3 below).

A working group is currently supporting the definition of indicators and monitoring arrangements for the Mai-Ndombe ER Program building on the national standards. This process is supported by the REDD+ SES initiative and conducted in a participatory manner with the provincial government and designated representatives from local communities and Indigenous Pygmy Peoples. Several workshops to build the capacity of and consult with provincial stakeholders in the Mai Ndombe ER Program were organized in 2015 and 2016, and provided an opportunity to discuss the risks and opportunities of REDD+ activities as well as mitigation measures and monitoring arrangements for safeguards.

Data collection. Monitoring data related to social and environmental aspects will be collected by the Local Development Committees (LDC), project holders, LEAs and the program management unit, but also by monitoring missions conducted by decentralized agencies and local consultative committees such as the Carts. Figure below presents a summary for each category of indicators, data sources, collection frequency, and the entities responsible for monitoring and reporting.

Data analysis and reporting. The program management unit will do a first data analysis and prepare the report in collaboration with the Provincial REDD+ Steering Committee as well as civil society and representatives of local communities and Indigenous Pygmy Peoples. Once the Provincial REDD+ Steering Committee of the program, approves the report, it will be shared publicly on the national REDD+ registry, and it will be sent to the FCPF Carbon Fund. The report will also be used to compile the national report on safeguards to be submitted to the UNFCCC.

Independent verification. To ensure the credibility of the report by the program management unit, the independent observers will act alongside civil society to verify the proper implementation of safeguards. It will produce an independent report with recommendations, which will be sent to the Minister of Environment for corrective actions as needed. The report will be assessed and validated by the National REDD+ Steering Committee.

[83]National Social and environmental standards of the DRC describe both the minimum safeguard measures and the expected co-benefits of REDD+ activities, therefore this section has a lot in common with Section 9.2 on the approach toward providing information on non-carbon benefits.

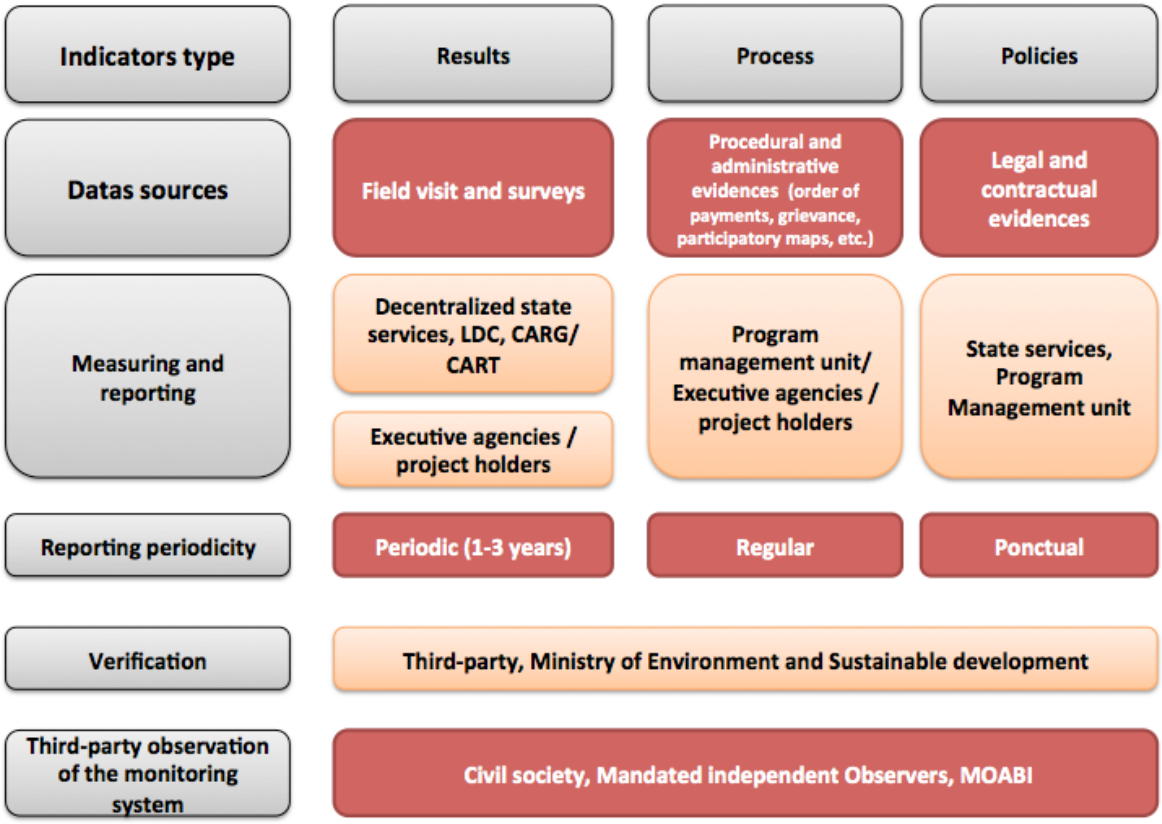


Figure 19: Arrangements for the monitoring system for safeguards and non-carbon benefits

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

The Social and Environmental Safeguards Assessment (SESA) process already proposed general principles and guidelines of grievance and redress mechanisms but there is still the need to define precise procedure and an adapted capacity building plan. A study that began in December 2015 will provide national and sub-national guidelines based on lessons learned by April 2016 (ref. Terms of reference on the FCPF website). The Mai Ndombe ER Program will be the first program to implement the new national guidelines. The effective implementation of FGRM in the program area will be under the responsibility of the program management unit and the implementing agencies and will be accompanied by outreach and capacity building activities. From the middle of 2016, the FGRM will be tested and the national REDD+ registry will provide a transparent platform for filing complaints and monitoring their handling.

While the development of a national FGRM with formal procedures is still ongoing, there are several mechanisms available on site allowing for the provision of feedback and the management of complaints, including through the various committees presented above such as LDC, CART and DGM governance bodies**.** Experience with local types of complaints mechanisms is emerging in the context of the pilot projects, and the CN-REDD is currently analyzing their strengths and weaknesses. Currently complaints that emerge in the ER-Program consultation and design phases are channeled through the REDD+ Focal point, and the communities designated representatives (see Section 5), which are in direct link with the

National REDD+ Coordination. The National REDD+ Coordination is piloting a collaborative work with his partners and the designated representatives to design the Safeguard Information System and the FGRM.

The SESA process in DRC has already established the key principles of the Feedback and Grievance and Redress Mechanisms: independence, impartiality, transparency, accessibility, efficiency, predictability, stakeholder engagement, compliance with human rights, non-coercion, flexibility and professionalism. It also includes certain steps for operationalizing the FGRM.

The following paragraphs summarize the different considerations and discussions occurring during the design phase, which permitted to design the main elements of a FGRM for the Mai-Ndombe ER program, as well as to identify the roles of different bodies (also see Annex 12). Further steps will ensure that this mechanism is elaborated in a participatory manner. Firstly, the present description of the mechanism will be developed and refined on the basis of the current study analyzing the lessons learned in term of GRM. This study will be led by a consortium including civil society, organizations, and targeted consultation, with representatives of communities and Indigenous Pygmy Peoples, including women and youth, will be done to develop and validate the mechanism that will be proposed in this study.

Issuing of complaints. Any person or organization will be able to make a complaint about a REDD+ through the proposed procedure, which will be available in the national REDD+ registry. The filing of a complaint will automatically inform the national authorities in charge of REDD+, as well as involved project holders or implementing agencies. In the case of rural people who have no access to the Internet, i.e. most of those affected by REDD+ activities, specific offices will be set up as part of the advisory boards such as LDCs and CARTs. These offices will be equipped with Internet access allowing them to relay the complaints to the registry and inform the Provincial REDD+ Steering Committee. The organizations of civil society can also serve as local contacts for the filing of individual or collective complaints.

Reasons for and type of complaints. Complaints may primarily relate to the contracts and agreements between parties. For instance, communities may want to complain about the contracts signed with project holders or the implementing agencies (e.g. as regards conditions or performance), in particular to ensure the effective implementation of planned investments in the SDPs of the territories. Non-compliance with social and environmental standards may be another reason for complaints by affected parties (e.g. poor participation, lack of transparency, rights to land and resources). The program will ensure, particularly through LEAs, that the parties and especially Indigenous Pygmy Peoples and communities are well informed about opportunities to raise concerns and complaints and, importantly, about the rights, benefits and conditions associated with REDD+ investments. Grievance and complaints which are not directly linked with the implementation of the program and/or which can't be solved by the program collaborative mechanisms and which concern for example corruption, coercion, violation of rights and/or policies will be referred to administrative or judicial bodies for formal investigation.

Handling of complaints. The procedure to cancel or to forbid bad practices which are generating grievances are to be addressed to the administrative and judiciary institutions that are habilitated to receive and treat the cases. The same for plaints on any mismanagement of the contracts obliging as well the project itself and the local communities or anyone else (administrations etc.). The cases being collected by the LDCs and CARTs (which are composed of a mixture of public and civil agents) or emitted by any civil institution or individual are treated at three levels:

1**)A level of mediation and decision which is internal** to the implementing scheme, including the LDCs, the CARTs, the administration, the civil society and at least, the Provincial REDD+ Steering Committee, headed by the governor of the province. Some of them will have administrative rights and obligations to deal with the cases. A procedure for handling complaints will be defined in detail but will mainly follow the following steps: (i) Complaints will be addressed primarily at the local level through the

LDCs/CARTs, (ii) If the complaint cannot be processed at this level (e.g. no consensus, no suitable mandate), it will be forwarded to the Provincial REDD+ Steering Committee for instructions, (iii) The Provincial REDD+ Steering Committee will trigger an investigation (which will include a civil society representative), (iv) Based on the results of the investigation, the Steering Committee will arbitrate if possible or refer the matter to the National REDD+ Fund Steering Committee. This committee will assess the case and forward it to the respective court or tribunals as needed.

2) **An external mediation, through the ombudsman**. The ombudsman is a mediator. As so he/she can help the parties to get to a consensus. The program may refer to independent mediators at various levels facilitate amicable settlements but it will also put into place **a continuous position of "ombudsman"** (organization or persons) to investigate the various complaints to facilitate their examination and handling. The latter would then be able to analyze sets of complaints, produce a summary report with recommendations to the Steering Committee and the implementing agencies and track actions taken by the program. Any one from the implementing scheme can call for the ombudsman help

3) If not, if there is no consensus or if it is not implemented, a decision is asked to the **relevant judiciary institutions**.

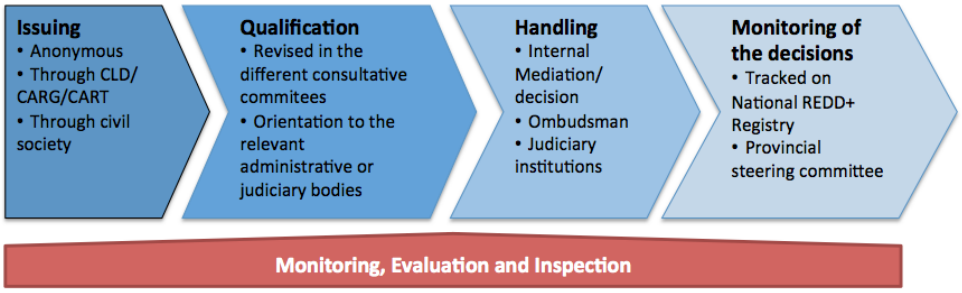


Figure 20 - Issuing procedures and complaints management at national level (source: National REDD+ Strategy Framework)

Monitoring of the implementation of decisions. Resolutions or arbitration to resolve complaints and appeals will be published on the national REDD+ registry. The implementation of decisions will then be monitored by the Provincial REDD+ Steering Committee and the program management unit, and if necessary, by local executive agencies and the CARTs. The decisions to resolve complaints may lead to financial sanctions or withdrawal of approval in the case of integrated projects.

Monitoring, Evaluation, and inspection. The role of monitoring and evaluation and external control of implementation will be fulfilled continuously by civil society through its local networks to ensure that (i) the means for issuing complaints are accessible and functional; (ii) the handling of complaints is effective and transparent and (iii) decisions are applied effectively. Civil society will rely on mobile technologies to share its analyses and findings on the effectiveness of the procedure on the ground. At the local level, representatives of communities, Indigenous Pygmy Peoples including women and youth will be involved in the evaluation of the mechanism.

The program will provide the financing for the program-level FGRM. An initial budget is proposed in the financial plan of the program and includes the following activities:

- Capacity building of stakeholders involved in the various stages of the issuing and processing of complaints (e.g. civil society networks, local and provincial governments) and training in eight territories.
- Internet equipment (in 19 sectors).

- Control missions at the provincial and territorial levels.

15. ARRANGEMENTS FOR BENEFIT-SHARING

15.1 DESCRIPTION OF ARRANGEMENTS FOR BENEFIT-SHARING

The principles, beneficiaries, and operational conditions of the distribution of carbon revenues discussed between stakeholders and presented in this section will guide the development of the benefit-sharing plan within the Mai-Ndombe ER-Program to be attached as an annex to the Emission Reduction Payment Agreement (ERPA) signed with the Carbon Fund. These principles may be revised at the end of the term of the ERPA, based on an evaluation of this initial phase of implementation of the program. The preliminary plan proposes an indicative distribution key for the sales under the ERPA during its period of execution. This indicative distribution will be updated and validated prior the signature of the ERPA.

For the program management unit and for those who will control its execution, the benefit-sharing plan will be the reference document for (i) the allocation of revenue from the sale of emission reduction credits (ERC) of the program between activities more or less directly generating emissions reductions and (ii) the monitoring of the distribution of income at the local level between the stakeholders, in conformity with the condition of repartition that will be settled in the sub-contracts of the program.

REDD+ BENEFICIARIES

Stakeholders are eligible beneficiaries if their contribution to the implementation of the ER Program and/or any legal claim to forest areas or forest products (including under general principles and/or customary law) is (i) formalized in a contractual agreement with the government, or (ii) in the absence of a contractual agreement with the government, if they de facto contribute to the implementation of the ER Program and increase the ER Program output, or (iii) if they are negatively affected by the ER Program. Terms of engagement will be laid out to allocate carbon rights in exchange for a claim to carbon revenues.

a. Participants with a **direct influence**, i.e. the legal or de facto managers of forestry resources who decide on how to enhance their value (production of goods). It is the state's public domain (protected areas); land concessions (agriculture, forestry, animal husbandry) and forestry (7 companies out of 18 concessions), small scale producers, local communities and Indigenous Pygmy Peoples (farmers, charcoal burners, hunters, or farmers) in customary lands.

b. Participants with **indirect influence**, i.e. players in the agricultural sector, forestry and charcoal burners in positions of contractors, buyers, processors, distributors, local, national and international consumers, whose request for environmental co-benefits associated with these sectors (e.g. driven by a bonus/malus taxation system) can focus demand and therefore management decisions by the producers.

c. The **political and administrative stakeholders** at different administrative levels - the executive and the elected provincial officials, the decentralized services of the State at the level of territories, elected councils from sectors or chiefdoms, groups (customary entities) - which control but also guide investment decisions through subsidies or tax incentives, or the issuing of titles for access to resources (licenses, concessions).

d. **Indigenous Pygmy Peoples.** The program intends to recognize the historical role of Indigenous Pygmy Peoples in sustainable forest management and help to reverse the dynamics of their marginalization in the non-sustainable forest management systems of today. Present in the only district in Mai-Ndombe and now partly settled, they also practice slash and burn agriculture. Frequent marginalization in local governance bodies and the low level of recognition of their traditional hunting and gathering rights calls for a differentiated consideration of their needs by the program. In this way, the program will address their frequent marginalization in local governance bodies and the low level of recognition of their traditional hunting and gathering rights in an integrated system for the planning of land use associated with incentives. The program will ensure the incorporation of their rights and needs into this planning.

BENEFIT SHARING PRINCIPLES

Initial principles for benefit sharing were agreed during the development of the Emission Reduction Program Idea Note (ER-PIN) and the design phase. This section presents a summary of principles and their consideration in the design and negotiation of sub-contracts (see below):

General principles

1. Benefit sharing is based on the principle of equity and seeks to fairly distribute costs and benefits of the ER Program between stakeholders that effectively contribute to the implementation of activities, either by addressing drivers of deforestation and forest degradation and/or protecting forests, or by facilitating the implementation of the ER Program.

The ER program seeks to maximize indirect and non-carbon benefits such as social, environmental and economic benefits. Based on a cost-benefit analysis (including non-carbon benefits), feasibility studies were conducted to examine the incentive level necessary for a change in practices. Incentives are designed to offer a premium beyond the compensation of costs.

2. 'Benefit sharing 'is focused on the distribution of revenues from the valuation of emission reductions generated by ER Program activities: Beneficiaries will receive a share of revenues as a reward for their performance and participation in implementing ER Program activities.

As such, the distribution of benefits also considers incentives from up-front investments and indirect benefits from ER Program activities:

- *Incentives from up-front investments ('investment incentives'):* Stakeholders will receive direct technical, financial and policy support from different types of up-front investments to incentivize their participation in ER Program activities.
- *Indirect benefits:* Stakeholders will indirectly benefit from their participation ER Program activities and from adopting improved land use practices. Examples for indirect benefits are livelihood opportunities, governance improvements, market premiums, or other social, environmental and economic benefits, most of which are described in Chapter 16 (non-carbon benefits).

3. Benefits will be shared in monetary and non-monetary form. They can take the form of payments for environmental services (PES), financial assets (ERC) negotiable over the counter or in a regulated market, proceeds from the sale of ERCs, and of incentives (goods and services) financed by the PESs or the proceeds of the sale of ERCs. Incentives will be distributed in monetary (e.g. through cash payments) and non-monetary form (e.g. through technical, financial and policy incentives).

4. The transparency of benefit-sharing contracts and the principle of free, prior and informed consent will apply to agreements between the government and nested projects holders, sub-contracts between the latter and local communities, and others implementation and proxy performance-based contracts with the private sector or local communities. For all the sub-contracts with forest or other agricultural concession, the FPIC principles will apply if the activities proposed have consequences on communities' land-use rights and/or existing agreement (e.g. *cahier des charges* with forest companies).

5. Generate a capacity for reinvestment. The program will generate net carbon benefits through (i) the carbon revenues generated by the up-front investment as FIP and others relevant activities and policies in the area, (ii)margin between the proxy payments and the carbon revenues and (iii) the benefits shared by nested project holders after covering their operational costs (as agreed in their carbon-related contracts), to the extent this project holders are not already covered by other ex-ante incentives. Net carbon benefits will be allocated to a revolving fund, which will be used by the program to up-front finance new enabling or sectoral activities (during the ERPA period or after). To the extent that the program performs, the surplus generated will then allow the program to ensure its own financing. The advance payment will be levied from this net carbon benefits.

Principles for the distribution of Emission Reduction Credits.

1. Benefit sharing will employ a mix of performance and non-performance based approaches: for performance-based payments, the performance measurement is either the amount of carbon not emitted or sequestered (Emission Reduction), or several non-deforested, regenerated, or planted hectares, which is a proxy for carbon performance (based partly on an estimated amount of carbon per hectare) whose measurement is less costly and complex to implement than a carbon MRV system. In each program monitoring report, ERC generated will be allocated transparently to the different project holders according to their performance against their specific baselines.

Some allocation of revenues will be directly done to support key stakeholders, independently of their direct carbon performance, which is often not measurable. Other output-based proxies will be used for activities that are essential for the success of the ER Program but cannot be directly measured in terms of carbon. This includes Indigenous Pygmy Peoples, which have a differentiated historical responsibility as described previously, but also the State at the provincial and territorial level, which have a direct responsibility in the success of the program and which require incentives in order to participate actively in the implementation and control of activities within the province. All the remaining benefits are allocated to the central government through the National REDD+ Fund to be reinvested in the program or others REDD+ activities within the country.

2. The Emission Reductions generated in the program area will take the form of Emission Reduction Credits (ERCs) registered in the national REDD+ register once the emission reductions are measured and verified. ERCs are allocated to the ER-Program entity (DRC government) and to holders of projects who signed carbon-related contracts with the government (cf. the Homologation Regulation as described in Chapters 4.4 and 18).

The program will recognize the **prior agreements linked with forest carbon valorization signed by the government** and subcontracts that are attached to it. This is the case of the ERA project that signed an

agreement in 2011 with the government and now held by Wildlife Works Carbon. Benefit-sharing principles with the government and communities set in this agreement will be respected. However, an alignment of the Reference Level with the program will be negotiated in order to ensure a balance between the need to align the project and program baseline but also to recognize the important private investment made by the project until now.

Except for the case where carbon rights have already been recognized/transferred by the state to the project holder, **new nested projects must go through homologation (under Homologation Regulation) and will be allocated a reference level** aligned with the one of the program but allowing an adapted incentive for the project holder to tackle existing and future risks of deforestation/degradation.

Nested projects will share their revenue with the government to cover the ER-Program transaction cost and allow the government to reinvest in the program activities.

All the remaining Emission Reduction Credit generated will be considered as the result of up-front investment as FIP and others relevant activities and policies in the area and will be owned by the government of DRC (for selling or UNFCCC reporting purposes).

Principles in the sales of Emission Reduction Credit

1. Purchase program with the Carbon Fund: The Government of DRC proposes to report and sell Emission Reduction every 2 years to the Carbon Fund until 2021. An advance payment of 10% is proposed for the first year (as explained in Section 6.2), which will be reimbursed by the following sales to the Carbon Fund. This advance payment allocated to the government will allow financing the Program Management Unit and implement additional key activities.

2. If the purchase volume is insufficient and the credit generation differential is too large between the different nested projects (project under carbon-related contracts), instead of distributing the funds in proportion with the performance of each project, sales of credits through the program will be performed in **successive rounds at the lowest possible allocation** to ensure that projects with low levels of allocation will have priority in benefit sharing. (See Figure 19 below).

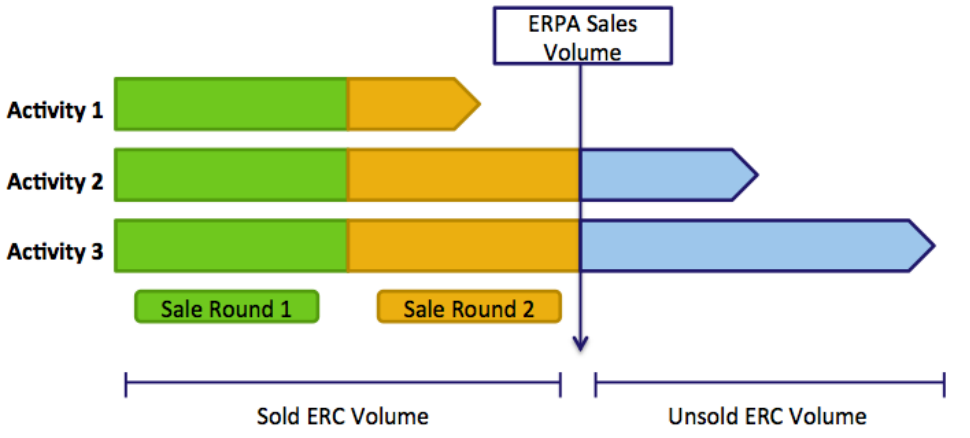


Figure 21: Principle in the sales of Emission Reduction Credit

3. The DRC government recognizes the principle **of serving the nested projects as a priority** because they are paid exclusively ex post based on a certified measurement of their carbon performance (return on investment stake), but also recognizes the need to **consider the reinvestment capacity of the program** (selling from the government to be reinvested). Consequently, project holders who signed carbon-related contract will negotiate with the DRC government the share of their ER credits that can be sold through the program to the Carbon Fund. This negotiation will be a compromise between the economic balance of the project and the capacity of reinvestment of the program.

4. In case of non-performance or sub-performance of the overall program after one reporting period, the program will keep track of individual performance of nested projects and will establish mechanisms to remunerate projects that performed. This will be done by (i) selling ERC from the previous reporting period, if available, (ii) remunerating directly projects through money kept for reinvestment if available (ii) establishing a shared buffer account for the program and nested project (as the one existing under VCS JNR standard).

BENEFIT SHARING SUB-CONTRACTS

Benefit-sharing arrangements will be executed through a contractual architecture with the different operators involved in the activities of the program. The contractual setting for the Mai-Ndombe Program supporting the envisaged ERPA with the Carbon Fund of the FCPF rests on two distinct ERPA pillars:

Carbon-related contracts (with project holders)

- These are the "partnership contracts" concluded under the Homologation Regulation with respect to projects within the Mai-Ndombe Program; (see Sections 4.4 and 17)
- The contracts identify project and direct ERC holdings, set methodological and standard rules for project implementation and define the modalities for REDD+ benefit-sharing between the central government, the provinces, local communities and others.
- The existing model contract (annex IV of the Regulation) will be amended as part of the revision to consider the application of the domestic standard, domestic issuance, and consolidated benefit-sharing approaches with stakeholders on the basis of the principle of voluntary participation (see below: "Implementation contracts") rather than government-imposed REDD+ action.
- As far as ERs in the Accounting Area are concerned, which fall within the scope of what is purchased by the Carbon Fund, the contracts will specify that all relevant ERCs allocated to project proponents be transferred to the government or to any other authorized entity for commercialization purposes.
- The contracts are concluded between the project proponents and the central government (i.e. the Ministry responsible for the environment) prior to ERPA conclusion or will qualify as conditions precedent for the entering into force of the ERPA.

Implementation contracts (with stakeholders, which are not project holders)

- These contracts are for conclusion between the government or the project holders and a wide range of stakeholders – defined in the Regulation as "any natural or legal person, local communities, Indigenous Pygmy Peoples, authorities, village associations and non-governmental bodies (recognized by the law) which may be affected directly or indirectly by the project" (article 3 of the Homologation Regulation) – to:
    - Achieve the approval of all relevant parties; and
    - Secure implementation of the REDD+ activities planned;

- The contracts specify the tasks and activities as well as indicators (e.g. deforestation / reforestation targets), but they are formally disconnected from the carbon-related contracts and do not imply the allocation, sale or transfer of ERCs.
- The contracts may lay down the rules for compensation (fixed or as a percentage of the ERC proceeds) and they may include rules on risk sharing, but their execution and implementation is *strictu sensu* not linked to the carbon performance of the project or program or the issuance and transfer of ERCs.
- Importantly, the contracts will always include an exclusivity and no-compete clause concerning the REDD+ activities and their exclusive eligibility under the national REDD+ program (or the REDD+ project in question); this clause strictly adheres to the rules on "double-counting", which are an integral part of the national REDD+ program, in general, and the contractual obligations under any ERPA.

For more information about the relevance of contractual arrangements depending of the type of land tenure and users, see Section 4.4 and Table 7. The contractual arrangements are described in the following flow chart:

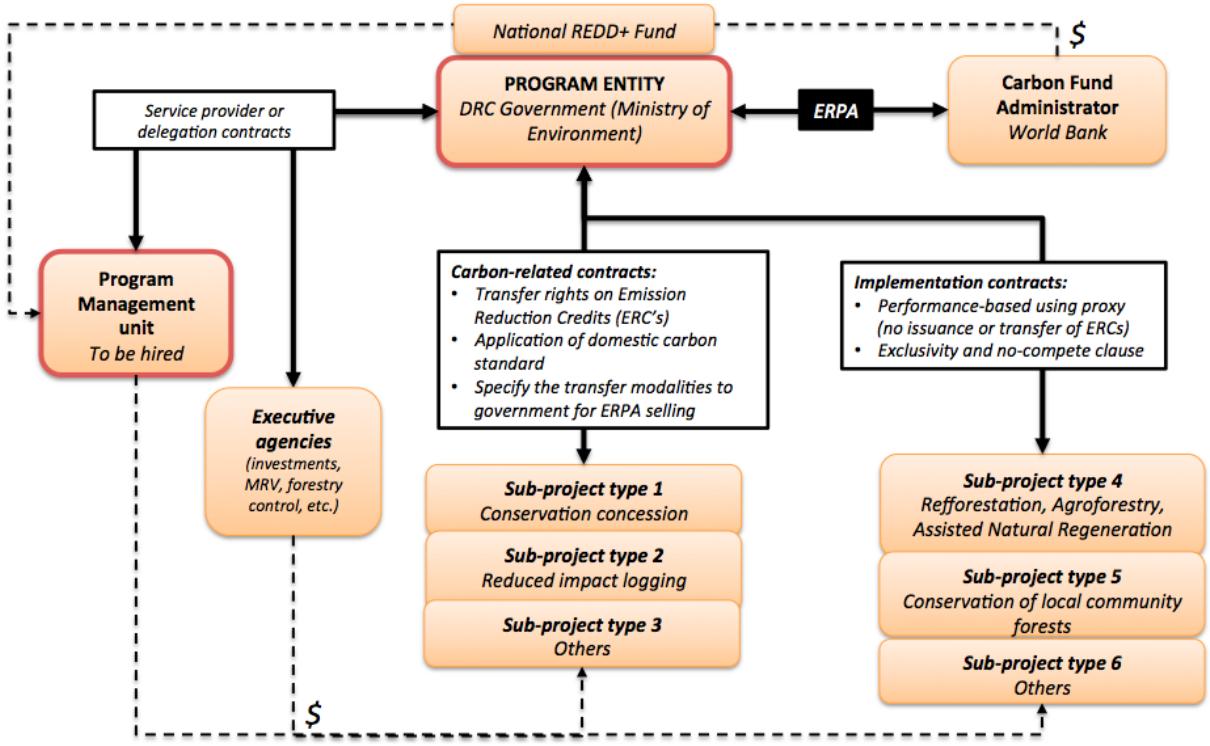


Figure 22: Contractual arrangements of the ER-Program

INDICATIVE SHARING PLAN

This indicative sharing plan offers a simulation of sharing revenues from the sales by the program of **15 $MtCO_2$ emission reductions at a price of 6,5 $/t** in the form of a $97,5 million sale spread over five years,

minus the 10% advance on the ERPA obtained for startup.[84] This purchasing program represents 50% of the potential emissions reduction estimated at 29 Mt over its first five years of implementation. (See Section 13)

Table 55: Indicative benefit-sharing plan for the FCPF ERPA

Benefits sharing plan	**ERPA Up-front payment**	**Total 5 years ($)**	**% ERPA**
Program transaction and monitoring costs	**5 671 782**	**5 671 782**	***6%***
Execution of carbon-related contracts with nested project	**-**	**26 371 682**	***27%***
WWC project	-	12 787 500	*13%*
Reduced Impact Logging/Conservation concession projects	-	4 326 739	*4%*
Nested project communities benefit sharing	-	9 257 443	*10%*
Reinvestment in the program activities	**4 078 218**	**54 078 218**	***56%***
Investment in enabling activities	4 078 218	15 598 218	*16%*
Investment in communities' sectoral activities	-	17 280 000	*18%*
Co-investment with private sector	-	3 200 000	*3%*
Operating cost (executive agencies costs)	-	18 000 000	*19%*
Other benefit sharing: indigenous peoples, province	**-**	**10 038 600**	***10%***
Unexpected items		1 339 718	*1%*
Total	**9 750 000**	**97 500 000**	***100%***

NB : This indicative benefit-sharing plan is proposed for information only for the purposes of illustrating the practical application of the principles and to lay a basis for discussion with all partners in the run-up to signature of the ERPA and the implementation of the final revenue sharing plan.

15.2 SUMMARY OF THE DEVELOPMENT PROCESS FOR BENEFIT SHARING ARRANGEMENTS

For the definition of enabling investments, the process began at the time of the program design, capitalizing on the feedback from the participatory mapping projects undertaken both in the territory of Bolobo and in Oshwe as part of negotiating the social clause specifications for forest concession holders (almost one million hectares have been mapped in this way by WWF, about 146 terroirs were involved and nearly 350 local development and conservation committees have already been organized) and for the preparation work of the PIREDD Plateau.

For the identification of sectoral activities, diagnostic surveys were conducted successively in each of the two districts based on the 2011 household survey. Funded under the Carbon Map Model, cost-benefit analyzes were produced during 2014 (i) at the level of customary lands of the Bolobo Territory to define

[84]Subject to ERPA negotiations

a community intervention strategy with draft contracts of the PES type and (ii) on Oshwe forest concessions with the REDD+ lever for the forest concession holders based on the work of the FORAFAMA project.

Based on the results of the study on the sharing of REDD+ benefits realized in 2011 by CODELT, a study on benefit-sharing was initiated by NC-REDD in 2015 to elaborate the principles in the ER-PIN regarding a review of national and international experiences, using a simulator of REDD+ benefits, proposals for sharing of the assorted benefits of contractual options for implementing them at both program and national level.

A Steering Committee comprising representatives of civil society (GTCR), the private sector, and the central and provincial administration was formed to monitor the study and discussion of institutional arrangements within the technical secretariat in charge of preparing the program document to reconcile the positions of stakeholders to the extent that the investment options became clearer and the eligibility of payments based on carbon performance or proxy performance was specified.

Following the May 2015 workshop that helped stabilize the principles and benefit-sharing options to be discussed, a process of more intensive consultation began to gather input from a broad range of representatives from national civil society. Civil society lawyers were also mobilized to bring the review of the order for approval to the government. In the continuation, meetings with local stakeholders at three key sites in the program area (South-Kwamouth, Bolobo, Inongo) and two sites outside began in July, allow to clarify the conditions for the operationalization of the benefit-sharing plan within the sub-contracts between the program and the local communities or concession holders and these communities. The results of this work will finally feed into proposals for national guidelines.

The indicative benefit-sharing plan presented above has not been agreed among stakeholders. It is also based on current simulation of participation of private operators that will be engaged in carbon-related contracts and existing sub-agreements with communities. The finalization of the benefit-sharing plan will involve several steps that are described in Table 56below:

Table 56Next steps and timeline for benefit-sharing plan finalization

Next steps	Timeline
Design of a risk map to define specific baseline for stakeholders	Mai-June 2016
Preparation of sub-contracts model (carbon-related and implementation contracts)	Mai-September 2016
Consultation and negotiation with stakeholders on sub-contracts development	June-December 2016
Final draft Benefit Sharing Plan is made publicly available in a form, manner and language understandable to the affected stakeholders. This draft Benefit sharing plan will include: - Draft of carbon-related contracts to be signed with nested projects including indicators, revenues sharing for transaction costs and reinvestments, agreements regarding sale of Emission Reduction Credit. - Model of implementation contract agreed among stakeholders - Proposition of an adaptive management strategy defining rules of allocation, sales, payment depending of the program and sub-projects performance.	December 2016

Validation and formal adoption of the proposed benefit-sharing plan by stakeholders	January 2017
Formalization of contractual agreements	After ERPA signature

15.3 DESCRIPTION OF THE LEGAL CONTEXT OF ARRANGEMENTS FOR BENEFIT-SHARING

See section 4.4, 15.2 and 17for details about legal context, program arrangement and contractual architecture

16. NON-CARBON BENEFITS

16.1 OVERVIEW OF POTENTIAL NON-CARBON BENEFITS AND IDENTIFICATION OF PRIORITY NON-CARBON BENEFITS

This subsection has been partially addressed in sub Section 4.3. The intervention strategy is presenting in detail how these benefits will be generated by program activities.

Priority non-carbon benefits have been identified during the feasibility studies to prepare the sub-investments program as the PIREDD Plateau (FIP) and PIREDD Mai-Ndombe (CAFI). From the consultation with stakeholders, 4 main categories of non-carbon benefits have been identified as priorities and condition for the program to succeed to engage and maintain stakeholders in implementation of mitigation activities. This identification has been materialized in the ER-Program main objectives defined at the ER-PIN stage: 1. Climate, 2. Biodiversity, 3. Rights, 4. Livelihoods and 5. Finance and Governance. Beyond the climate objective, the program seeks to make substantial progress on the following non-carbon objectives:

BIODIVERSITY: Biodiversity is maintained and ecosystems services are improved

The program strategy seeks to maintain existing forest cover and increase regeneration of anthropogenic savannas.

The program will support conservation by strengthening existing protected areas, supporting the development of community conservation areas and enforcing flora and fauna regulation. This strategy will impact biodiversity by providing habitats for animals and by reducing hunting. Reforestation and natural regeneration of anthropogenic savannah will also foster vegetal biodiversity and play a role in maintaining soil (against erosion) and fertility.

Biodiversity co-benefits of this program will thus be shared among all type of stakeholders: increasing maintenance of soil fertility and sustainability of agriculture, increasing economic opportunities such as Non-Timber Forests Products and eco-tourism, providing means of action for governmental conservation agency, providing opportunities for premium prices for logging or agricultural companies wanting to engage in environmental certification scheme.

RIGHTS: The legal and customary and users' rights of local communities and Indigenous Pygmy Peoples over land, territories and resources are recognized, respected and strengthened

The program will initiate spatial planning at the different levels (local, decentralized territorial entity, province). This process will start with a terroir level process that will identify uses and rights via the development and validation of a participatory map. This will serve as a basis to develop Sustainable Development Plans (SDPs) at terroir and territory levels. The individual and collective rights identified by this process will be recognized and enforced by the administration. To achieve this the program will encourage the enactment of a provincial law (*edit provincial*) to validate the SDPs and make them binding on third parties. The sub-contracts developed based on the SDPs between communities, the government

and local executing agencies or project developers will help to clarify rights and duties of parties regarding mitigation activities and benefit-distribution. It should be added that by supporting the creation of forest concessions of local communities the program would put into practice the community forestry legal frameworks.

As mentioned in Section 3.2, in some cases indigenous people only have fragile user rights and the discrimination that they face can compromise their ability to assert and defend their rights during the negotiations. Indigenous Pygmy Peoples' land and user rights must however be duly recognized and protected. The provincial law mentioned above will provide the framework to ensure that SDPs have been elaborated with the fair participation of all and include a complete description of all users' rights. The provincial law would impose that all users' rights are clearly mentioned in the SDP and that any future modification in the land allocation requires the Free Prior and Inform Consent of all the affected users, including Indigenous People.

LIVELIHOODS: REDD+ benefits are shared equitably; improve local livelihoods in the long-term and the well-being of stakeholders, with a focus on the most vulnerable groups

The program should generate additional and diversified incomes for households and private sector (farmers and big companies) and should provide collective socio-economic investments In the form of grants to local communities and private sector co-financing, the program will represent a driver for value production in rural areas, creating jobs (direct and indirect) and revenues.

Indeed, generating additional income from higher yields and diversification of the sources of agricultural revenues is at the heart of the strategy of the program. It aims to use agroforestry to demonstrate the profitability of working in savanna areas independently from carbon revenues (food crops based on improved varieties in combination with wood energy or fruit, palm oil, rubber). Furthermore, it targets to rehabilitate or develop perennial crops plantation generating alternative revenues and diverting workforce from slash-and-burn practices.

It is expected that non-carbon benefits in some cases could take over carbon revenues as incentives to maintain low carbon development options promoted by the program. To make these options viable, the program will strengthen perennial crops and wood energy economic sector in order to maintain continuous demand. The program therefore is designed as an incubator for economic activities where carbon revenues are used as an investment lever for the private sector, loosening the capital and cash flow constraints until the investments reach maturity.

Once launched, the program will fund major investments in the collective infrastructure as roads, bridges, and transformation facilities to facilitate economic development, stable prices and access to markets. Part of the program carbon revenues will be reinvested to extend these investments. Forestry and conservation concession will also channel a share of revenues towards collective infrastructure through the existing social clauses framework.

FINANCE AND GOVERNANCE: Immediate, sufficient and predictable resources are mobilized to reward performance in the priority forest areas in an equitable, transparent, participatory and coordinated manner

For each of these non-carbon benefits objectives, indicators, baselines and 5-years targets are presented in Annex 5.

16.2 APPROACH TO PROVIDE INFORMATION ON PRIORITY NON-CARBON BENEFITS

This subsection has been discussed in Subsection 8.2, because the program has an integrated approach to monitoring and evaluation of safeguards and non-carbon benefits (co-benefits are part of the REDD+ social and environmental standards of the DRC)

The sound application of safeguards as well as the generation of non-carbon benefits[85] during the implementation of the program will be disclosed through the following channels: (i) regular information posted in the National REDD+ Registry (ii) a monitoring report on the environmental and social standards of the program published annually (or bi-annually) and (iii) an independent report produced by civil society and based on independent observation mission. Roles and responsibilities are detailed in Annex 12.

Non-carbon benefits will be monitored and reported according to the matrix presented in Annex 5 that provide details on indicators, baselines and 5-years targets.

[85] National Social and environmental standards of the DRC describe both the minimum safeguard measures and the expected co-benefits of REDD+ activities, therefore this section has a lot in common with Section 9.2 on the approach toward providing information on non-carbon benefits.

17. EMISSION REDUCTION CERTIFICATES

17.1 ER AUTHORIZATION PROGRAM

Name of entity	Ministry of Environment, Nature Conservation and Sustainable Development
Contact person	Victor Kabengele
Title	National REDD+ Coordinator
Address	Avenue Colonel MONDJIBA N°63 BIS Concession COTEX Municipality of Ngaliema/Kinshasa, DRC
Telephone	+243 824 378 018/+243 999 995 462
Email	abckab@gmail.com
Website	http://www.mecnt.gouv.cd/
Reference to the decrees, laws or other types of decisions identified by this national authority within the ER-P.	1. Ordinance No 08/074 of 24 December 2008 defining the responsibilities of the Ministry; 2. Ministerial decree No 09/40 of 24 November 2009 concerning the creation, composition and organization of the implementation structure for the process of achieving emission reductions in deforestation and forest degradation ("REDD"); 3. Ministerial Regulation 004/CAB/MIN/ECN-T/012 of February 15, 2012 fixing the procedure for approval of REDD+ projects ("Homologation Regulation"); 4. Presidential Ordinance No 15/015 of 21 March 2015 on the remit of the ministries

17.2 TRANSFER OF EMISSION REDUCTION CERTIFICATES

The DRC central government holds the role of coordinator for the country's (national) REDD+ activities and, in that role, defines management elements and functions for REDD+ programs and projects developed underneath the national REDD+ governance level. This includes decisions on the structure and process for ERC generation, direct ERC holdings by program and project holders, and the option of back-to-back commercialization of ERCs by such holders, without the mediation of the central government.

Within the DRC government, the Ministry for the Environment, Nature Conservation and Tourism is the competent authority for REDD+ implementation, project authorization, and main entity for REDD+ valorization.

The Ministry will sign the ERPA and assumes direct liability towards the contracting partner – here the FCPF Carbon Fund – for REDD+ implementation, ERC generation, and exclusive transfer of good and valid title.

It is noted that for its financial implications, the Ministry of Finance must approve the ERPA.

Execution and fulfillment of the ERPA does not involve any other authorizations. The sale and transfer of emission reductions relate to emission reductions only and do not affect any beneficial, legal or customary interests or rights in land (see above Section 4.4).

The Ministerial Regulation on REDD+ Project Authorization of 2012[86]("Homologation Regulation") – currently under revision – has as its objective to:

i. Provide an identification and registration process for sub-national REDD+ activities not implemented directly by the Government but nested in the national REDD+ program;
ii. Create a continuous national REDD+ registry to track sub-national activities and the direct issuance of ERCs to project holders; and
iii. Define general conditions for the direct commercialization of ERCs by project holders.

Key features of the Homologation Regulation

The Regulation describes the process for project holders – legal personalities, land tenure holders or others, whether public or private – to inscribe their activities in the national REDD+ program, to have it validated against an "international" standard, as approved by the DRC government (see annex V of the Regulation), and to receive direct access to ERCs issued and nested within the national scheme for back-to-back commercialization.

Authorization follows a 3-steps cycle: (1) approval (approbation, article 11) by the "permanent Commission", created under the authority of the registrar (the Ministry in charge of the environment); (2) the execution of a "partnership contract" between the registrar and the project holder (contrat de partenariat, the model is included in annex IV)) on stakeholder involvement, benefit sharing and rules for the valorization of the "environmental services" reflected by the project (article 15); and (3) positive external validation, which is conditional for the coming into force of the partnership contract (article 18). The validator verifies the existence of, among others, the partnership contract as well as the conclusion of an agreement between the project holder and affected local communities and/or Indigenous Pygmy Peoples, assesses the project design description (PDD) against the requirement of an international standard, and examines the results and impact of the stakeholder consultation (article 18). The validator,

[86] Arrêté Ministériel Nº 004/CAB/MIN/ECN-T/012 du 15 février 2012 fixant la procedure d'homologation des projets REDD+.

after confirming that the project requirements are met, transmits the validation report to the registrar, which authenticates and publishes the report. Publication has the effect of project authorization and grants the right to the project holder to commercialize ERCs issued for the project independently (article 20).

It is noted that the authorization process is mandatory for all project holders whether private or public, except the regions, which hold genuine constitutional rights and legislative powers and are not directly bound by the Ministerial Regulation in question. If a region wishes to integrate in the national REDD+ program as program holder of its own – as is the case of Mai-Ndombe – the central government and the region in question clarify the terms of engagement, jurisdictional validation and nesting, as well as the rules for ERC account holdings and direct commercialization through an internal governance act.

2015/16 Revision of the Regulation

A revision of the Regulation is under way and expected to be adopted in the first half of 2016 ("Revised Regulation"). The Regulation was criticized by civil society on form – it has been adopted in the absence of any wider stakeholder consultation process – as well as on substance. It requires formal legal incorporation of project holders (article 2), to the disadvantage of communities and public collectives, and it overlaps with the concept of forest conservation concessions, created under Decree No. 08/2008, which gives concession holders the right to the valorization of forest-inherent environmental services, on the condition that all extractive exploitation be avoided.

While these issues are being addressed, the revision may also take the opportunity to introduce a domestic carbon-cum-socio-environmental standard for the validation of project activities and the issuance of DRC-specific REDD+ credits. Project holders will still be permitted to seek issuance of international credits, but all international credits will need to be converted from domestic credits when implemented.

18. DATA MANAGEMENT AND REGISTRY SYSTEMS

18.1 PARTICIPATION UNDER OTHER GHG INITIATIVES

The ER-Program will register with the Verified Carbon Standard (VCS) under its Jurisdictional Nested REDD+ (JNR) framework.

The Mai-Ndombe REDD+ project (VCS ID 943), led by WWC, will be registered as a nested project in the program under JNR Scenario 2 (see the Jurisdictional and Nested REDD+ (JNR) Requirements 2.1.1(2)). In a coordinated way, both the project and the jurisdiction will contribute GHG credits to the jurisdictional buffer pool and request issuance of verified carbon units (VCUs).

The DRC hosts also some CDM projects out of the Program boundaries but which could address the drivers of deforestation, these are:

a. The IbiBatéké degraded savannah afforestation project for fuelwood production (REF 4176), afforestation and reforestation project estimated to produce 54,511 metric tonnes CO_2 equivalent per annum in ERs.

b. The Congo Improved Cook Stoves program (REF9638), energy demand program of activities estimated to produce 36,167, metric tonnes CO_2 equivalent per annum in ERs (WESD Capital/Ecosur - Bisonabino project)

18.2 DATA MANAGEMENT AND REGISTRY SYSTEMS TO AVOID MULTIPLE CLAIMS TO ERS

DRC has decided to maintain its own national ER transaction registry. The ER-Program will be included in the National Registry of the DRC's national REDD+ program. This Registry will allow to track and monitor all the ERs generated by the program and provides regular information about issuances, transfers and sales of this Emission Reductions.

The National Registry will provide all the information about projects and programs in the country, such as: Entities who own the ERs titles, geographic boundaries, reference level, monitoring report on activities, safeguards and non-carbon benefits, etc. This Registry is currently in design and will be operational mid-2016. Its requirements specification fits with MF criteria. An administrative procedure linked with the Homologation Regulation (cf. Chapters 4.4 and 18) exist and is currently revised to address more actual challenge of information about REDD+.

This revision will allow clarifying that Emission Reduction Credits will be issued exclusively through the National REDD+ Registry. Registry accounts will be created for all authorized project holder as well as the government (with specific sub-accounts for regions/jurisdictional programs).

After any Emission Reductions are reported and verified, the respective ERCs will be issued directly into the relevant account(s), with a separate quota going into one or more of the relevant (government) buffer accounts (to account for uncertainties and reversals).

ERC issuance requires both carbon verification and verification of the relevant social and environmental thresholds defined under the domestic standard.

Project holders may freely transfer ERCs issued to them, under a sales agreement, conversion (from domestic ERCs into e.g. Verified Carbon Units) or other.

The following figure explains the creation, issuance and transfer of the ERCs generated for Mai-Ndombe, in the context of a sale to the Carbon Fund of the FCPF.

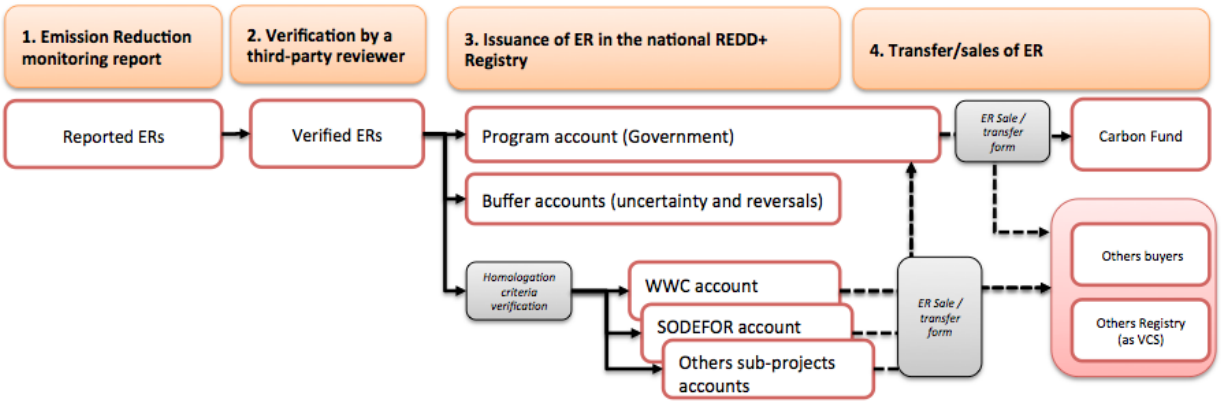


Figure 23: Issuance and transfer of Emission Reduction Creditor the Mai-Ndombe ER-Program through the National REDD+ Registry

Annex 1 Summary of the financial plan

Financing plan		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Items	**Description**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**TOTAL**
Expected uses of funds												
Costs Related to the Administrative Oversight of the Program	*Cost of the Program Management Unit + administrative cost of the National REDD+ Fund*	-	397 000	397 000	764 000	764 000	764 000	764 000	764 000	764 000	764 000	6 142 000
Operational and Implementation Costs	*Costs of ER-Program measures (cf. Section 4.3)*	12 401 954	12 935 308	16 611 983	20 493 301	21 181 086	8 070 000	8 358 000	8 646 000	8 934 000	9 062 000	126 693 632
	Management and operating cost (30%) MOD & FIP suivi	2 857 350	2 857 350	3 809 800	4 762 250	4 762 250	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	29 049 000
	Sectorial activities											
	AS1. Agroforestry and improvement of cultivation techniques	835 000	835 000	1 113 333	1 391 667	1 391 667	768 000	768 000	768 000	768 000	768 000	9 406 667
	AS2. Perennial crops development in non-forest areas	810 000	810 000	1 080 000	1 350 000	1 350 000	512 000	512 000	512 000	512 000	512 000	7 960 000
	ES1. Assisted natural regeneration for charcoal production.	285 000	285 000	444 000	603 000	667 000	192 000	192 000	192 000	192 000	128 000	3 180 000
	ES2. Afforestation/Reforestation for charcoal production	450 000	450 000	600 000	750 000	750 000	640 000	640 000	640 000	640 000	640 000	6 200 000
	FS1. Reduced impact logging	69 142	138 285	207 427	345 712	483 996	-	-	-	-	-	1 244 562
	FS2. Conservation of local community forests	118 500	237 000	491 000	880 500	1 366 000	1 654 000	1 942 000	2 230 000	2 518 000	2 710 000	14 147 000
	FS3. Conservation concession	2 345 712	2 691 423	2 691 423	2 691 423	2 691 423	-	-	-	-	-	13 111 404
	FS4. Afforestation/Reforestation for lumber production	1 500 000	1 500 000	2 000 000	2 500 000	2 500 000	-	-	-	-	-	10 000 000
	Enabling activities											
	H1. Capacity-building of decentralized State services	107 400	107 400	143 200	179 000	179 000	256 000	256 000	256 000	256 000	256 000	1 996 000
	H2. Multi-level capacity-building and Sustainable Development Plans design	376 350	376 350	501 800	627 250	627 250	256 000	256 000	256 000	256 000	256 000	3 789 000
	H3. Implementation of collective and strategic facilities	747 500	747 500	996 667	1 245 833	1 245 833	256 000	256 000	256 000	256 000	256 000	6 263 333
	H4. Family planning	210 000	210 000	280 000	350 000	350 000	192 000	192 000	192 000	192 000	192 000	2 360 000
	AH1. Strengthening agricultural value chains	350 000	350 000	466 667	583 333	583 333	256 000	256 000	256 000	256 000	256 000	3 613 333
	EH1. Formalization and strengthening of the fuelwood sector	50 000	50 000	66 667	83 333	83 333	192 000	192 000	192 000	192 000	192 000	1 293 333
	FH1. Strengthening forest and wildlife law enforcement	210 000	210 000	280 000	350 000	350 000	256 000	256 000	256 000	256 000	256 000	2 680 000
	FH2. Legal compliance of industrial logging operations	225 000	225 000	300 000	375 000	375 000	-	-	-	-	-	1 500 000
	FH3. Development of community forestry.	450 000	450 000	600 000	750 000	750 000	448 000	448 000	448 000	448 000	448 000	5 240 000
	FH4. Support management of protected areas	405 000	405 000	540 000	675 000	675 000	192 000	192 000	192 000	192 000	192 000	3 660 000
Financing costs (e.g., interest payments on loans)	n/a	-	-	-	-	-	-	-	-	-	-	-
Costs related to development and operation of the MRV	*Cost of all different MRV modules for ER generation and benefit sharing purposes*	-	85 000	189 970	175 581	306 579	325 053	437 536	409 648	511 760	548 872	2 989 999
Costs related to the Implementation of Benefit Sharing Plan	*Allocation under the benefit sharing plan*	-	-	-	5 636 801	-	15 193 790	-	15 579 691	-	-	36 410 282
Costs related to the implementation of the feedback and grievance redress mechanism(s);	*Equipments, control field audit and capacity building*	-	167 640	167 640	167 640	167 640	128 640	128 640	128 640	128 640	128 640	1 313 760
Costs related to stakeholder consultations and information sharing	*Communication support production and dissemination, regular consultative workshop*	-	58 700	117 400	176 100	176 100	176 100	176 100	176 100	176 100	176 100	1 408 800
Total costs		**12 401 954**	**13 643 648**	**17 483 993**	**27 413 423**	**22 595 405**	**24 657 583**	**9 864 276**	**25 704 079**	**10 514 500**	**10 679 612**	**174 958 474**

Financing plan		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Items	**Description**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**TOTAL**
Expected sources of funds												
Secured Grant funding	*FIP PIREDD-Plateau*	2 130 000	2 130 000	2 840 000	3 550 000	3 550 000	-	-	-	-	-	14 200 000
	CAFI PIREDD Mai-Ndombe	4 504 500	4 504 500	6 006 133	7 507 667	7 507 667	-	-	-	-	-	30 030 367
	CAFEC USAID on Salonga and Lac Tumba Landscape	331 500	331 500	442 000	552 500	552 500	-	-	-	-	-	2 210 000
	KFW for Protected Area management on Salonga national park	900 000	900 000	1 200 000	1 500 000	1 500 000	-	-	-	-	-	6 000 000
	Project Carbon Map and Model financed by KFW	600 000	600 000	800 000	1 000 000	1 000 000	-	-	-	-	-	4 000 000
	Global Environment Facility (GEF) project to support conservation	3 000 000	3 000 000	3 000 000	1 000 000	1 000 000	-	-	-	-	-	11 000 000
	Funding from FIP project supporting private sector in DRC (component 2a)	337 500	337 500	450 000	562 500	562 500	-	-	-	-	-	2 250 000
Private funds secured	*WWC private investment*	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	-	-	-	-	-	10 000 000
Private funds to be confirmed	*(Current status of interest)*	2 265 895	2 265 895	3 021 193	3 776 491	3 776 491						15 105 965
Revenues from REDD+ activities (e.g., sale of agricultural products)	*Non-carbon revenues*	-	2 635 294	3 981 342	5 887 040	21 600 980	29 347 893	54 326 858	37 738 715	37 148 993	51 697 916	240 365 031
Revenues from sale of additional Emission Reductions (not yet contracted)	*ERPA with Carbon Fund*	-	9 750 000	-	11 700 000	-	65 100 000	-	40 950 000	-		97 500 000
Total sources		12 319 495	24 704 789	25 740 569	46 786 198	40 800 138	64 947 893	54 326 858	78 688 715	37 148 993	51 697 916	417 161 664
Net revenues before taxes (=total sources - total uses)		(82 459)	10 061 741	8 256 575	19 372 775	8 204 733	40 290 310	24 462 581	52 984 636	26 534 493	41 018 304	242 203 190
Net revenues w/o non-carbon revenue		(82 459)	8 425 847	(1 724 567)	8 485 735	(3 396 247)	10 942 417	(3 864 276)	15 245 921	(10 514 500)	(10 679 612)	31 338 158

Annex 2 Sources of Funding and Breakdown by Key Activity

Funding Sources (in M$ USD)														
Strate carbone	Key activities	FIP PIREDD Plateau	*CAFI PIREDD Mai-Ndombe*	*GEF project*	CAFEC-S	CAFEC-LT	KFW-S	CMM	DGM	*Advance payment FCPF*	FIP comp 2	Private investment secured	Private investment non-secured	Totals
Sectorial activities	AS1. Agroforestry and improvement of cultivation techniques	1,7	3,1		0,1	0,35		0,1	0,25	0				5,57
	AS2. Perennial crops development in non-forest areas	0	5,2						0,2					5,40
	ES1. Assisted natural regeneration for charcoal production.	1,3	0,4			0,2								1,90
	ES2. Afforestation/Reforestation for charcoal production		0,0							0	1		2,0	3,00
	FS1. Reduced impact logging		0,0		0	0		0,1					1,2	1,34
	FS2. Conservation of local community forests	1,2	1,2	1,0	0,1	0,2		0,1	0,15	0				3,95
	FS3. Conservation concession		0,0										3,1	3,11
	FS4. Afforestation/Reforestation for lumber production		0,0								1,25		8,8	10,00
	WWC REDD+ Project		0,0									10		10,00
Enabling activities	H1. Capacity-building of decentralized State services	0,412	0,3											0,72
	H2. Multi-level capacity-building and Sustainable Development Plans design	0,649	1,7						0,2					2,51
	H3. Implementation of collective and strategic facilities	0,85	4,1											4,98
	H4. Family planning		1,4											1,40
	AH1. Strengthening agricultural value chains		2,3											2,33
	EH1. Formalization and strengthening of the fuelwood sector		0,3											0,33
	FH1. Strengthening forest and wildlife law enforcement		0,0		0,1	0,2				1,1				1,40
	FH2. Legal compliance of industrial logging operations		0,0							1,5				1,50
	FH3. Development of community forestry.		0,0	1,5						1,5				3,00
	FH4. Support management of protected areas		0,0	2,0	0,2	0,1	0,4							2,70
	Management and operating cost (30%) MOD & FIP suivi	8,089	10,0		0,21	0,45	0,2	0,1						19,05
	Total	14,2	30,0	4,5	0,7	1,5	0,6	0,4	0,8	4,1	2,3	10,0	15,1	84,2

Annex 3 Overview of the consensus of participatory self-assessment (February 2014)

No.	Criteria	Evaluation
1	Accountability and transparency	
2	Mandate and operational budget	
3	Mechanism for multisectoral coordination and cross-sector collaboration	
4	Technical supervision capacity	
5	Fund management capacity	
6	Mechanism for feedback and appeals	
7	Participation and commitment of major stakeholders	
8	Consultation process	
9	Information dissemination and access to information	
10	Use and disclosure of the results of consultations	
11	Assessment and analysis	
12	Ranking of favorable/unfavorable elements, direct and indirect elements, the development of forests	
13	Linking these favorable/unfavorable elements and the activities of REDD+	
14	Action plans to consider the rights to natural resources, land tenure and governance	
15	Impact on forestry laws and policies	
16	Selection and prioritization of strategic options for REDD+	
17	Feasibility assessment	
18	Impacts of strategic options on sectoral policies in force	
19	Adoption and application of laws and regulations	
20	Implementation guidelines	
21	Benefit-sharing mechanism	
22	National REDD+ register and REDD+ monitoring system	
23	Analysis of issues relating to social and environmental safeguards	
24	The design of the REDD+ strategy based on impact	
25	Environmental and Social Management Framework	
26	Demonstration of the method	
27	Use of historical data and adaptation in the national context	
28	Technical feasibility of the methodological approach and compliance with the UNFCCC guidelines and recommendations of GIEC	
29	Explanation of monitoring method	
30	Demonstration of the first phases of application	
31	Institutional arrangements and capacity	
32	Identification of aspects not connected with and social/ environmental issues	
33	Monitoring, reporting, and exchange of information	
34	Institutional arrangements and capacity	

Annex 4 Work Program for the Consolidation of the Preparation Phase for REDD+

Key elements preparation	Remaining activities at the time of the R-Package approval	Expected results	Achievements May 2016	Next steps	Calendar & responsible organism
Component 1: Organization of preparation and consultation					
Institutional arrangements	Revision of the decree establishing a Steering Committee for the REDD+ process Clarification of the methods of cooperation between the Steering Committee and the national REDD+ fund	The institutional and financial arrangements are operational	Operationalization of Fonds National REDD+: - 1st COPIL meeting Set up of the Interim Executive Secretariat (SEI)	Launching of calls for expression of interest for the PPD and Concept Notes Designation of members & meeting of the technical committee Request for transferring the 2016 funding round. Second meeting Steering committee to validate chosen 4 expressions of interest Disbursement of allocated funds to selected organisms	June 2016, SEI July 2016, COPIL August 2016 September 2016 November 2016
Complaint and appeals mechanism	Study on defining the mechanism based on lessons learned and development of a plan for putting into operation the Mai-Ndombe emissions reduction program Formalization with MOABI of support for the collection and monitoring of complaints Reinforcement of the capacity of players	The principles and responsibilities are defined at national level The mechanism is strengthened at the level of the Mai-Ndombe emission reduction program	Presentation of literature on complain & appeal mechanisms	Consultation in Mai Ndombe Procedural proposals at national level & capacity building plan for Mai Ndombe Implementation of the capacity building plan in the Mai-Ndombe	June 2016 August 2016 August- January 2016 (CN-REDD/Minadev)
Decentralizatio n of REDD+	Training and creating awareness of REDD+ among key stakeholders and provincial governments Development of provincial REDD+ strategies Support in the formulation of REDD+ programs integrated in the oriental and equator provinces	Provincial strategies are developed REDD+ integrated programs are formulated with the commitment of provincial players	Training & awareness concepts elaborated Upgrading of deforestation factors within the 5 pilot provinces Financial & human capacities are assessed REDD+ University of Grand Kassai	Elaboration of the provincial REDD+strategy Diagnostics on fuel woods Finalization of integrated programs	July 2016 August 2016 (CN-REDD)

Information dissemination and access to information	Publication of key documents on the REDD+ process on the website of the Ministry and/or on the National Register Design of key messages on REDD+ in a broadly participatory process Design of adapted communication materials	All key documents are available online The key messages are developed Suitable supports are widely disseminated	Launching of the CN-REDD revue REDD+ Broadcasting messages Communication support tools for ERPD validation Communication support tools for provincial focal points Capacity building on REDD for communities' radios Information workshop for Kinshasa Universities	Set online key documents	June 2016 (CN REDD)
REDD+ reforms	Support for the National Land Reform Commission (CONAREF) and its sub-committees for the implementation of land reform Support for the Spatial Planning Support Unit (UAAT) and the development of the national planning strategy	The reforms related to land use and management of natural resources are progressing	Consulting company on land reform chosen (Okapi)	Signature of the contract Launch of the consulting work	May 2016 June 2016 (CN-REDD/ Okapi)
REDD+ strategy	Capitalization of project experiences and REDD+ initiatives (including 6 REDD+ pilot projects funded by the CBFF) Organization of a large national forum for the dissemination of lessons learned Fund raising and alignment of the National Agricultural Investment Program	Lessons learned lists are published and shared A monitoring framework for the national REDD+ is defined Financial resources available to implement the strategy	Capitalization Workshop in Luki Working Groups establishing capitalization lists	National forum on capitalization and monitoring Monitoring framework defined	July 2016 August 2016 (CN REDD)
Component 2: Preparation of the REDD+ strategy					
Legal and normative framework for REDD+ management	Revision of the approval order to integrate the recommendations of the CGES and civil society Monitoring of the reform of the Forestry Code and the application of environmental law to include aspects related to REDD+ Strengthening of collaboration with parliamentarians through the partnership with Globe Ground Training of the judiciary in the fight against corruption in REDD+	Decree of approval and its annexes are reviewed and validated A training plan for the combating of corruption in REDD+ is prepared The process of revising the legal and regulatory framework, including the Forestry Code and the agricultural code, is progressing	First draft of homologation decree under revision delivered	Elaboration of procedural guide for REDD+ projects and activities in DRC. Draft decree for REDD+ projects approval	June 2016 August 2016 (CN REDD)

Benefit-sharing mechanism	Validation of options and mechanisms for benefit sharing at the level of the Mai-Ndombe emissions reduction program Validation of directives at national level	Guidelines validated at sub-national and national level	Guidelines for Mai Ndombe delivered	Preparation of benefit sharing contracts for Mai Ndombe program	July 2016 (CN REDD/GFA)
National Register	Registry programming based on specifications Reinforcement of the capacity of users	Operational registry	Working plan and requirement specification approved Register concept delivered	Delivery of the manuel tools Training of users	July 2016 July 2016 (CN REDD/ONFI)
Environmental and social management	Description of the operational methods for the implementation of safeguard tools Integration of CGES in the decrees implementing the framework law on the environment Formation of national expertise for ESIS	Safeguard instruments are operational instruments CGES integrated into the legal and regulatory framework	National Safeguards elaborated	National FPIC Guide Operational modalities for safeguards in place	July 2016 July 2016 (CN REDD)
Component 3: Reference emission levels/reference levels					
Reference level for emissions	Finalization of the reference level at the level of the Mai-Ndombe emission reduction program Preparation of a national reference level in line with the sub-national approach	Reference level validated by the DRC and Carbon Fund Reference level presented to the COP-21	National Reference level methodological note presented to the COP-21 Sub-national Mai Ndombe reference level coherency method with national reference level	Revised national reference level methodological note National reference level to be submitted at COP22	May 2016 November 2016 (DIAF/CN REDD/FAO)
Component 4: Monitoring system of forests and safeguard measures					
SNSF	Clarifications and formalization of responsibilities for the MNV of the Mai-Ndombe emission reduction program Reinforcement of the DIAF to put into operation the MRV nationwide	Operational MNV at the level of the Mai-Ndombe emission reduction program Operational MNV at national level	Definition of MNV methods and processes	Conceptual note for national MNV National MNV for 2014 – 2016 period	June 2016 2017 (DIAF/FAO)
SIS	Experimentation on monitoring tools Finalization of the institutional arrangements for compiling and reporting of information Development of the information system on the safeguards (SIS), in accordance with the provisions of the UNFCCC Capacity reinforcement of players involved in the monitoring system	Operational information system integrated into the registry	Capacity building of players	Preparation of forms in relation to socio-environmental aspects to be integrated into the Registry Institutional modalities	July 2016 (CN REDD/CCBA)

Annex 5 ER Program objectives, indicators and 5-years targets

Main objectives of the program until 2021	Indicators	Baseline (if available)	5-years targets
1. CLIMATE: Emission reductions of 30 million tons CO2 are achieved compared to the reference level and the pressure on forests is reduced	Net Emission Reduction (tCO2)	n/a	25 Million tCO2 for 5-year period
	Annual Emission due to deforestation and forest degradation (tCO2/year)	68 Million tCO2/yr	56 Million tCO2/year in 2021(Reduction of 18%)
2. BIODIVERSITY: Biodiversity is maintained and ecosystems services are improved	Surface of community forests under conservation (ha)	-	500 000 ha
	Surface of natural regeneration and reforestation in savannah (ha)	-	50 000 ha
	Surface of conservation concession (ha)	200 000 ha	400 000 ha
	Change in abundance and distribution of targeted species	to be defined	to be defined
3. RIGHTS: The legal and customary and users' rights of local communities and Indigenous Pygmy Peoples over land, territories and resources are recognized, respected and strengthened	Number of terroirs mapped by participatory cartography clarifying rights	-	400 terroirs mapped
	Number of terroirs with a validated Sustainable Development Plan	-	250 terroirs with a validated sustainable Development Plan
	Number of community forest concession validated	-	3 community forests concessions (20 000 ha each)
4. LIVELIHOODS: REDD+ benefits are shared equitably, improve local livelihoods in the long-term and the well-being of stakeholders, with a focus on the most vulnerable groups	Average revenues per households (USD/year)	400 $/year	Around 30 000 households (10% of rural population) will benefit from direct investments and get an average revenues of 600$/year.
	Average revenues per farmers (USD/year)	1000 $/year	Around 2500 farmers will benefit from program activities and get an average revenues of 1800 $/year

	Socio-economic investments	Lack of infrastructure for transportation and transformation	To be defined
	Increase productive employment linked to REDD+, including potentially vulnerable and marginalized persons	to be defined	to be defined
5. FINANCE AND GOVERNANCE: Immediate, sufficient and predictable resources are mobilized to reward performance in the priority forest areas in an equitable, transparent, participatory and coordinated manner	Number of LDC and CART restructured and operational	no data	400LDCs and 19 CART have been established and are functional
	Number of REDD+ Provincial REDD+ Steering Committee meetings	n/a	20 meetings (quarterly)
	Number of complaints received, handled and redressed	n/a	n/a
	Number of independent observation reports	n/a	3 reports
	Funds received and used by the ER Program, including transfers of funds from emission reductions, performance-based payments and reinvestments	n/a	n/a

Annex 6 Overview of the situation of the Indigenous Pygmy Peoples population in the Mai-Ndombe province and recommendations (extract from theBioCFplus feasibility study)

Current situation

- **The Indigenous Pygmy Peoples (IPP) are present in the province of Mai Ndombe** in the three Territories of Oshwe, Inongo, and Kiri, which are otherwise populated by Anamongo groups.[87]IPP are also present in other Territories of the Province, living near other non-Anamongo populations (Teke, Badia, Basakata) but only marginally. This arrangement consists almost exclusively of urban communities of IPP whom the traders and planters of colonial times used as security guards or worker, after encountering them in the Territories that were home to such populations. These groups, sometimes reinforced by recent additions drawn from the same Anamongo Territories, often in the same villages, form IPP communities of 100-200 households in Katu, Nioki (Badia District), and Bokoro (Basakata District).
- **The question of an earlier presence of IPP in the Province of Mai Ndombe** is complex. According to Isidore Ndaywel,[88] they were led there from Equateur Province by the Mongo between the 14th and the 18th centuries, when they gradually moved southward to the shores of Lake Mai Ndombe, being driven on by other Mongo. With the help of the Pygmies, these Mongo chased out the populations that lived around the lake, which Ndaywel sees as identical to the Teke (Nsese). Little research has been conducted on the more ancient history of these matrilineal Teke populations[89] or on the other major matrilineal group of the South, the Sakata, or the Pygmies. Perhaps in earlier times, they themselves chased the Pygmies toward the northern Equateur region when they wandered into the edges of the forest following rivers upstream. Similarly, the Kundos of Oshwe say that they pushed the Bantu populations toward Kwilu Territory, on the opposite side of the Kasai River, which today is their southern limit and which they now have to cross in order to reach land suitable for cultivation.
- **However, not all the Mongo brought Pygmies with them** or live with them today. This is the case of the Basengele in Inongo Territory, the Batito and Ipanga in the Oshwe (between Lukenie and Kasai), and the southern Kiri Groupings. For example, Oshwe, the main city of Batito District (Kundo), encounter Pygmies only in urban areas, consisting of some 200 families of recent colonial origin, as in the Sakata, Dia, and Teke areas.
- According to respondents from these populations,[90] the martial and common origin of the presence in the region of two populations, the Twa[91] and the Mongo, explains two significant facts: (i) the Twa neighborhoods are still located along roads on either side of Bantu villages for protection against enemies after the fashion of their respective positions during the conquest,

[87] This term is used to refer to populations speaking related languages of Bantu origin, whose origins are to be found in one of the three major branches of Central African human settlements, which, originating also from the southern shore of Lake Chad and under pressure from climate change, have migrated toward the northern forest (Equateur Sud, Northern Bandundu), while another migration bypasses the lake to the East, thus forming the current population of the Savannah. Included in this large group are most southern Equatorial people (Mongo) as well as, in the future Mai Ndombe Province, the Ntomba, Ekonda, and Kundo, and further out, the Tetela of both Kasai and Maniema. There is uncertainty over the date of these Bantu migrations, which Ndaywel (*Histoire du Zaire*, Duculot, African Edition, 1997, 49-51) situates at around the beginning of the Christian era.

[88] Isidore Ndaywel. *Histoire du Zaïre de l'héritage ancien à l'âge contemporain*. Duculot, 1997.

[89] These consist of Western Bantu people. Today, the Teke inhabit the Plateau Territories (Kwamuth, Bolobo, Yumbi) as well as the East bank of the Kwango River.

[90] Meetings of the BioCf*plus* Mission with the Ntombe Nzale chiefs and the Twa, November 2014.

[91] Twa is the local name for the Pygmy people.

with the Twa toward the front and as the rearguard of the Bantu troops, and (ii) the oldest villages have a Twa Land Chiefdom granted to their ancestors by the Bantu warlords in gratitude for their roles as warriors.

- Some exclusively Twa villages also have a Land Chiefdom, such as the Bolia, the Ntomb'e Nzale, and the Nkaw (Mbidiankana, Imoma, Bokongo). Villages with their own Land Chiefdom also have a Twa local Chief, who is sometimes the Land Chief (Nkumu).
- The Twa identify themselves as part of the Mongo clan, to which they are connected and with whom they share a patrilineal structure.[92] All of them speak languages specific to the clan, in addition to Lingala, which they all share. However, the Twa more frequently converse in their own language.
- Table 6 shows the location and number of Pygmy populations in Mai Ndombe District, by Administrative Sector:

Table 6: Location and number of Batwa populations in the future Mai Ndombe province

Territories and Sectors	Population (2014, Health ministry)	Area (km²)	Density (2014, Health ministry)	Number of villages	Number of IPP villages	Number of mixed villages	Estimated population (BioCf*plus* mission, 2014)*	% of total population
Inongo								
Basengele	141,422	7,545	19	250	1	1	50	0%
Inongo	106,756	10,695	10	116	4	18	4,400	4.1%
Bolia	58,758	6,499	9	125	7	37	8,800	15%
Total Inongo	306,936	24,739	12	491	12	56	13,250	4.3%
Kiri								
Beronge	159,334	13,945	11	115		19	3,800	2%
Lutoy	70,747	5,158	14	42	4	25	5,800	8%
Pendzwa	67,513	3,144	21	75	8	75	16,600	25%
Total Kiri	297,594	22,246	13	232	12	119	26,200	9%
Kutu								
Badia	74,523	3,229	23	29	0	0	300	0%
Batere	72,737	1,656	44	83	0	0		0%
Mfimi	113,761	6,040	19	123	0	0		0%
Kemba	93,551	3,977	24	105	0	0		0%
Luabu	51,222	3,917	13	49	0	0		0%
Total Kutu	405,796	18,819	22	389	0	0	300	0%

[92] This is characteristic of the Anamonogo peoples, just as strictly matrilineal lineage is characteristic of the Teke and Basakata. Ndaywel sees in the survival of matrilineal lineage among the Mongo an indication of the old conflict affecting the territory they share with the Teke peoples or those related to them, whom they absorbed rather than chased away.

Territories and Sectors	Population (2014, Health ministry)	Area (km²)	Density (2014, Health ministry)	Number of villages	Number of IPP villages	Number of mixed villages	Estimated population (BioCf*plus* mission, 2014)*	% of total population
Oshwe								
Lokolama	8,152	18,652	0	81	4	2	1,200	15%
Nkaw	56,276	7,413	8	75	11	0	2,200	4%
Lukenie	63,529	6,356	10	50	0	0	200	0%
Kangara	34,111	8,720	4	54	0	0	0	0%
Oshwe	162,069	41,141	4	260	15	2	3,600	2%
Total Mai Ndombe District	1,172,394	106,946	11	1,372	39	**177**	43,050	3%
							3%	

Sources: Ministries of Health and of the Interior, CNI, and PDPA

(*) Combining available sources, including PDPA

- The Batwa thus represent between 3 and 4% of the population of Mai Ndombe District. Traditionally, they are present in only 7 of the 15 Sectors in the District. They have 39 villages of their own and share 177 villages with the Bantu. In the province as a whole, the Pygmy presence is documented in 15% of villages but in 30% of the villages in their traditional Sectors. In Penzwa, Lokolama, and Bolia Sectors, they represent between 25 and 30% of the population.
- In this same Anamongo area, another population than the Pygmies is in a minority as well as discriminated against, namely and their descendants. To our knowledge, there are no studies on this question or their current level of subjugation or emancipation.
- In the District as a whole, the Pygmies have become—and likely have been for some time—sedentary or semi-sedentary. The presence of a Land Chiefdom (representing 18% of villages) and thus integration into the customary Mongo political system (or *nkumu*) suggests that a sedentary lifestyle is not new to them. According to accounts recorded by the BioCf*plus* mission when it passed through the area, not a single fully nomadic Pygmy camp remains. All of the communities have strong ties to village lands, even if they do not own them. Hunting and gathering activities are centered around the village to which they attach themselves within barely more than a 20-30 km radius.
- For all the IPP the BioCf*plus* mission met in the Mai Ndombe Territories in question, the basis of activity, food security, and incomes is agriculture. However, their fields are small in the eyes of the Bantu, who thus accuse them of idleness while at the same time making them work in their own fields, for which they are the principal farmers in Sectors most marked by a Pygmy presence.[93] Based on our own observations, the size of IPP fields is of the order of one quarter of a hectare or less, which represents between 80 and 100 work days and is capable of guaranteeing basic food

[93] The accusation of idleness is widespread throughout the country and also targets the Bantu, but at an individual level, while it is generalized in the Pygmy population. In the BioCf*plus* mission survey of November 2014; one of the most-frequented listed causes of poverty (other than age, illness, or death of a spouse) was laziness.

security.[94] The question of the IPP's occupations must be examined globally. Table 7 shows the scheduling of the various activities performed by the IPP, which show considerable variety. Harvesting wild palm trees and the production of oil, providing daily piecemeal work for the Bantu, and hunting are practiced freely throughout the year, with a peak in time spent in hunting camps in November-December. (These camps are all male and last barely more than a week.)

Table 7: Occupations of the IPP of Inongo Territory throughout the Year

Month		Scarcity	Oil	Piecemeal Work (3)	Fishing	Hunting (1)	Gathering (2)	Honey
1	January	Sometimes			Creel, scoopnet, trap			
2	February						mintalo	
3	March				Cree			
4	April				Creel			
5	May						ntukuyu	
6	June				Creel, scoopnet, trap			
7	July						mbondoyo, ntule, bionge, Ipipili, ndoko	
8	August							
9	September							
10	October						ningolo	
11	November					Camps		
12	December							

Source: Inongo participatory workshop

Items in the "Gathering" column are the various types of caterpillars harvested

- The Pygmies of Mai Ndombe District are the main providers of wild palm oil for the markets thanks to their climbing abilities. They are also major providers of bushmeat and honey. The quantities they produce can be quite large. For example, a village of 50 households can bring several barrels of honey to market in a single year. Hunting is practiced mostly using traps (with rope and nylon snares available in markets) but also with 12-caliber shotguns made locally, for shooting monkeys.
- While the Ebola epidemic remains rife in a confined area in Boende Territory, the Batwa met by the BioCf*plus* Mission in November 2014 stated their hostility toward any regulation of monkey hunting or any prohibition against the consumption of monkey meat and other bushmeat, such as bats. Although information about the risks incurred appears to be available to them (as least in the villages visited within a 50-km radius around the cities), the risks seem remote and largely balanced by the desire to consume both fresh and smoked meat, a preference that is clearly shared by the Bantu.

[94] Some IPP have already fully converted to agriculture and well-tended fields exceeding one hectare can be seen, for example in the IPP village camps along Badia highway in Kutu. However, the environment is one of great anthropic pressure and where hunting resources are scarce.

- In the three forest Territories of Mai Ndombe District, fish and bushmeat consumption is common and often occurs twice weekly. However, the Bantu themselves recognize that the IPP' diet is more varied as well as richer than their own and that it takes up a large share of the IPP' monetary resources. In fact, the IPP enjoy relatively regular daily incomes, even if they are low, unlike those of the Bantu. However, the latter are subject to the seasonality of agriculture to a greater extent, even though they too practice hunting, fishing, and gathering. Table 7 shows the periodic scarcity in cassava in January and February, particularly in urban areas and months of intense farming and harvesting during the short cycles of Season A and in preparation for Season B, when time for preparing cassava is lacking.
- In most of the traditional Sectors with IPP settlements, land is still available (see Section on deforestation in Chapter 1), except in urban areas and along highways, where human densities within a 5-km radius are an issue (amounting to an hour's walk to reach a field). Table 8 shows that for most villages not too remote from a major city in Mai Ndombe District, land is available at low cost.

Table 8: Access to IPP land in three Inongo Groupings

Groupings and villages		Land		IPPLand Chiefs	Mixed Villages	Number of Households	
		Available	Further than 10 km			< 50	50-100
Ntomba Zala							
West							
	Belembe						
	Bankai						
	Botaka						
	Baugo						
	Benkondi						
East							
	Luatekaka						
	Rizières						
	Centre com						
	Bobangi						
	12 km						
	Bongema						
	15 km						
	19 km						
	21 km						
	Nkolo Mbanza						
Ibenga							
	Bolingo						

Groupings and villages		Land		IPPLand Chiefs	Mixed Villages	Number of Households	
		Available	Further than 10 km			< 50	50-100
Ntomba Zala							
	Nkonde						
Iyembe							
	Balondo						
	Ibali-Ngongo						
	Ngong'Iyembe						
	Ikenge						

Source: CART participatory workshop conducted in November 2014 at Inongo. BioCf*plus* Mission.

- One of the principal sources of income for IPP is daily piecemeal work. The area to be worked varies considerably in the future Province, ranging between 100^{2} and $200^{2.95}$ Table 9 provides a comparative view of all opportunity costs for agricultural production in Mai Ndombe District, based on the wages paid for piecemeal work, which are the same for the Bantu (if they become day workers, which is rare in villages were there are IPP) and for the Pygmies.[96] A fully worked hectare represents CDF 725,000, equivalent to about USD 785, or USD 1.50-2 per day worked (assuming 450 work days per hectare). These wages are the same in all DRC provinces where the reference unit of payment is the price of a basket of cassava tubers. However, the rate is different in Kiri Territory, where the unit of payment is a bottle of *lotoko* beer. There, the price of labor is less than half that in other areas. There is no justification for this. Kiri is relatively close to Mbandaka, a large market town, and the price of imported products is the same as at Inongo. This suggests that marked discrimination affects this Territory with respect to wages for work carried out almost exclusively by IPP. Moreover, this is the Territory where accusations of idleness on the part of IPP are the most frequent and agricultural labor by the Bantu most rare.

Table 9: Wages for of agricultural labor in Mai Ndombe District (in CDF)

		Badia Kutu (*)	Inongo (*)	Kiri (**)	Oshwe (*)
1	Clearing (Lobenzi)	4,000	4,000	1,600	4,000
2	Slaughtering	8,000	8,000	3,200	8,000
3	Hoeing and planting (+ 500 if using cuttings)	4,000	4,000	1,600	4,000
4	Weeding (2)	4,000	4,000	1,600	4,000
5	Harvest, retting, drying, and transportation (⅓ of the harvest)	9,000	9,000	4,500	9,000
	Total tasks	29,000	29,000	12,500	29,000
	Total hectares	725,000	725,000	312,500	725,000

[95] In most regions of the DRC, surface area is measured in terms of "x squared," that is in squares of 25, 50, 75, or 100 meters a side. Marie Nourtier has shown that in Kwamuth Territory, the estimates made by the farmers of the size of their cultivated land using this system were only 20% accurate. Task area is measured in steps converted to meters.

[96] Reported by the IPP encountered in villages throughout the BioCf*plus* Mission in November 2014.

Reduced to the Badia task area, that is 400 m^2 (20 x 20 m, 400 m^2, 25 tasks per hectare)

* Based on 20 x 20 m (400 m^2) and indexed on the price of a basket of cassava tubers

** Based on 10 x 10 m and indexed on ¾ of a bottle of premium *lotoko* beer

Source: BioCf*plus* Mai Ndombe Mission, November 2014

- Relations between the Mai Ndombe IPP are marked by both complementarity and frustration. This complementarity affects economic activities and the selling of products (with the IPP buying cassava and the Bantu buying game, honey, oil, and other gathered products), while cultural complementarity is seen in shared musical festivities as well as in the supply of traditional medicinal products. However, frustration manifests itself with respect to labor compensation, as we just saw, and especially in interpersonal relationships still marked by domination and disdain, particularly in highly unequal romantic relationships, which are sanctioned between Bantu men and Pygmy women but never in the opposite direction.[97] Even if we recognize that the situation is evolving, the Pygmies remain apart, and the taboos that affect them are real, for example with respect to food prepared by them.
- When the IPP experience frustration, they express it loud and clear. This is a general trait that merits underscoring. The Pygmy population of Mai Ndombe District is not locked away in victimized silence. On the contrary, they complain, and make their grievances known emphatically,[98] including before Grouping Chiefs and the authorities, and they seize every opportunity to do so. They also organize and multiply village associations, name Community Chiefs and, except for the Inongo case, where a conflict exists between them and the Chief who recently falsely presented himself as their representative, they recognize and appreciate the individuals they appoint to be REPALEF focal persons and members of the Dedicated Grant Mechanism (DGM) Steering Committee.
- Educated Bantu, the administrative authorities, religious associations, and civil society universally recognize that justice is an area in which the Pygmies are in a position of weakness. It is widely acknowledged that they systematically lose court cases to the Bantu, particularly over matters of real estate and occupancy, most frequently in pre-urban areas. It seems that they do not have the same convincing arguments as the Bantu with which to assert their rights and resist the abuse of which they are victims (including the refusal of tenants to pay rent or the refusal to apply the provisions of usufruct agreements for their plantations).
- If the IPP's access to land appears not to distinguish them from other residents of the Province, including citizenship (since they sign up to electoral rolls in large numbers throughout the province and fully exercise their right to vote), it is entirely different for health and education services. In these domains, indicators flash red. Despite the advent of free education in 2013, the rate of primary school education among Pygmy children is only 10% or less of that for Bantu children, even though the latter have to pay school fees and are often excluded from the school system by their very inability to pay. Meanwhile, the health center visitation rate is also much lower for IPP (in terms of childbirths in maternity wards and number of visits to health centers). The explanation they give for this poor performance is always the same. First, they refuse to see themselves as victims of attitudes of rejection and exclusion on the part of Bantu employees of the education and health services. Previously, they lacked money due to their poverty. However, this is only in partly true today, as we just saw, and it is clearly no longer true for their children's education or for access to health services as the cost of access to both health services and education is very low in the District. As they are for the most part settled within Bantu villages, distances to schools and

[97] A song was written, which is well known by all Pygmies, in which they sing that love is the last curve in the road to equality with the Bantu.

[98] The Inongo Bantu people say that the IPP are "complainers."

maternity clinics is no greater for the IPP than for the Bantu. The IPP recognize that the main cause of the dropout rate that affects their children is the lack of appeal of education to these children and the scant authority of parents to make them attend school. These children prefer to study natural science with their parents. Similarly, they have great confidence in their traditional medicine and do not automatically turn to modern medications for their healthcare. On this point, their addiction to alcohol and hemp constitutes a serious health problem as well as a source of impoverishment because it is well known by all and first of all by themselves that a major part of their incomes goes to pay for these addictions, quite apart from all of the social consequences and image problems these generate. In addition, their remoteness from health centers also deprives them of messages conveyed by these health centers, for example, with respect to Sexually Transmitted Diseases (STD), which are particularly present in the Territories and are wreaking havoc there, though it is true that the population is a victim of it and that the response of the health system to this issue is poor.

Recommendations

The Inongo IPP have Plans for the Development of Indigenous Pygmy Peoples prepared by the FNCP. They made a substantial contribution to the drafting of these plans, which focus on obtaining means of investing in the domains of health, education, and agricultural development. These are much-needed investments for all populations in the region.

Based on the analysis that has just been presented and consistent with the orientations of the National Strategic Framework for Indigenous Pygmy Populations (World Bank 2009), we make the following recommendations for the Mai Ndombe REDD+ Project:

- Proceed with and reinforce the penetration of the associative movement among the IPP population of the District so that it has institutions capable of analyzing the social conditions of the communities and can formulate and implement appropriate strategies. This is a lengthy process that could be accomplished with the DGM. Foremost in this process are public awareness campaigns targeting health, education, and access by the citizens to their rights. With respect to this last point, we recommend studying the possibility of providing the IPP with dedicated legal consultants;
- Prioritize educational concerns, to be handled by the internal associative movement and by support to the IPP, over the issue of the addictions to which they are subjected and means to overcome them;
- Ensure that the IPP profit systematically and in a concerted manner from the benefits brought by the Project, in terms of investment in planting perennial crops likely to secure their land rights and provide regular incomes. We also recommend integrating this explicitly into the LDC and in the Sustainable Development Plans for the Sectors;
- Require a separate organization for IPP in all mixed villages but which would be integrated into the LDC so that they enjoy legitimate representation in the LDC management councils and other levels of consultation (including the CARTs);
- Lean on these separate organizations to create a mechanism for handling appeals and grievances specific to the IPP.

Annex 7 Engaging industrial logging concessions in the Mai Ndombe ER program

1/ State of play of industrial logging concessions in Mai Ndombe province

There are 20 industrial logging concessions in the Mai Ndombe province, amounting to around 3 552 717 ha, which represents about 28% of the province's total area. **Logging companies therefore are de facto stakeholders in the program.**

Table 50Industrial logging concessions in the Mai-Ndombe province

Company	**N° CCF**	**Area CCF (ha)**
ITB	005/11	127 719
CIE DES BOIS	021/11	148 081
SODEFOR	034/11	194 346
SODEFOR	035/11	200 144
SODEFOR	038/11	173 921
SODEFOR	039/11	238 896
SIFORCO	040/11	194 636
SODEFOR	045/11	336 916
FOLAC	048/12	185 171
NBK SERVICES	049/14	79 730
TALA TINA	050/14	40 040
SOMICONGO	052/14	294 014
SCTP ex-ONATRA	055/14	121 214
RIBA CONGO	056/14	37 367
SODEFOR	061/14	239 858
SODEFOR	062/14	73 074
SODEFOR	063/14	287 309
SODEFOR	065/14	225 105
SODEFOR	Lolé	234 895
SODEFOR	Nkaw	120 281
Total		**3 552 717**

In 2015, only **7 concessions** out of 20 engaged into logging operations (see Map 9). However, even among these, none had met the operating program established in the 4-year Management Plan, both in terms of areas and volumes. The absence of logging operation, or operation below the levels agreed by contract, often results in delays in the implementation of the social clauses with communities and social tensions within companies.

In addition, control missions over the past years in the Mai Ndombe province have identified numerous compliance issues, such as concessions exceeding their harvesting limits, harvesting outside of their permit areas, lacking management documentation or not fulfilling their social obligations.[99]

These issues are posing a risk to the environmental integrity of the program's reference scenario, as well as to the implementation of REDD+ environmental and social standards. A framework to engage industrial logging companies in the program has been designed with the objective of mitigating those risks and foster logging concessions' compliance with the objectives of the ER program and DRC law.

2 / Minimum REDD+ Compliance standard for forest concessions

A **REDD+ compliance standard** for logging concessions has been elaborated by the ER program technical Secretariat, in cooperation with logging companies and with technical support from the European Forest Institute (EFI) and the consultancy FRMi. The standard was elaborated through cross-referencing DRC's legal framework with REDD+ objectives. This standard provides a **simple and non-exhaustive** framework aimed at informing about the state of play of concessions' compliance with selected legal provisions most relevant for REDD+, i.e. provisions which have a direct impact on:

1) GHG emissions and the environmental integrity of the reference scenario, and

2) compliance with REDD+ environmental and social safeguards.

The REDD+ compliance standard is based on **3 principles**:

- **Principle 1:** forest concessionaires engaged in REDD+ projects or initiatives must be legally established in the DRC and hold the rights of access to the forest resources they value.
- **Principle 2**: forest concessionaires engaged in REDD+ projects or initiatives must demonstrate their commitment to sustainable forest management, promote environmental services, including through limiting the impact of logging operations on forest cover and enhance the preservation of biodiversity.
- **Principle 3**: forest concessionaires engaged in REDD+ projects or initiatives must ensure that the rights of local communities and workers are respected.

These 3 principles are divided into 11 indicators and 23 verifiers. Most verifiers are documentary, to allow for a yearly monitoring with limited resources. A simple scoring system enables to assess the global performance of a concession regarding the standard.

3/ Incentives for logging companies to engage in the program

Monitoring logging concessions' compliance in Mai Ndombe aims at ensuring that companies operating within the boundaries of the jurisdictional REDD+ program **are not jeopardizing**, **through illegal practices**, **the ER program's credibility and its objectives**.

In this view, a **minimum performance threshold** vis-à-vis the REDD+ standard is proposed. Only concessions that will score above this threshold will be allowed to develop integrated REDD+ projects (reduced impact logging or conservation, as proposed in the program) and benefit from payments for results. The minimum threshold will be raising yearly to encourage progressive compliance of logging activities.

A concession below the threshold, or which wishes to improve compliance regarding the REDD+ standard, will be able to, under certain conditions, benefit from **compliance support**, financed by the ER program (see activities FH2). Compliance support will address in priority gaps and issues identified through yearly compliance assessments.

[99] OI FLEG, Rapport de mission de terrain n°2, décembre 2012

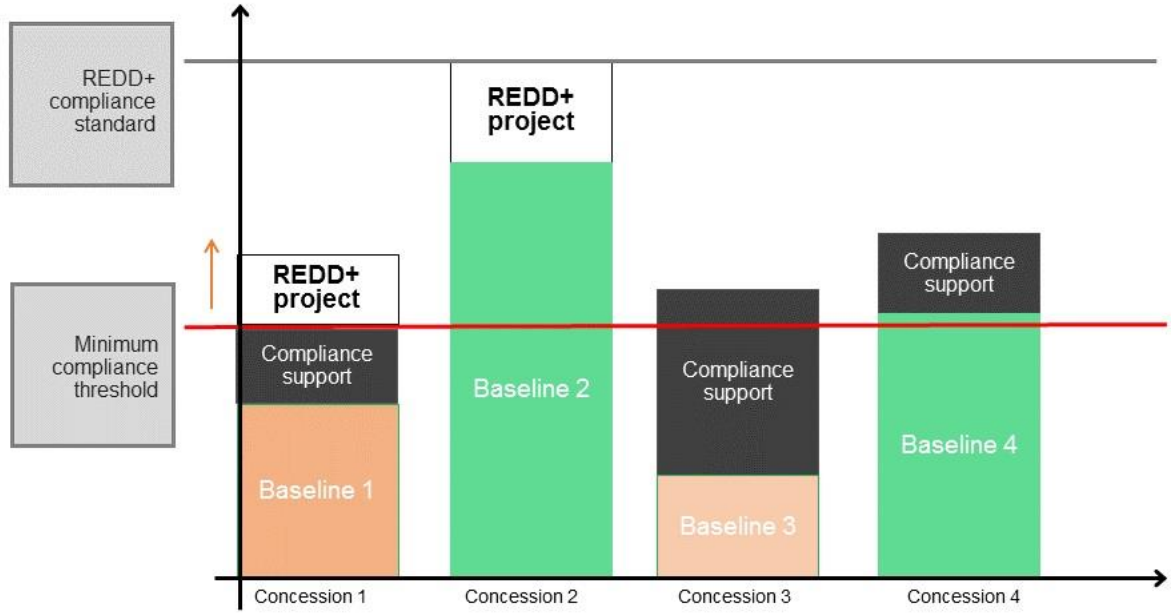
The following activities will be proposed:

- Technical assistance and staff training for forest inventories, socio-economic studies and management plans. Co-financing of forest inventories.
- Technical assistance and training for management plan implementation, social clauses implementation and implementation of rural development areas.
- Technical assistance for the elaboration of REDD+ projects (for concessions above the threshold – see activities FS1 and FS3).

These activities will be complementary to enabling support provided to the administration and aimed at strengthening forest control (see activity FH1).

Figure 22 below summarizes the different cases:

Figure 24 Situation of concessions with respect to the minimum REDD+ compliance standard



It is important to note that the REDD+ compliance standard for concessions **does not create a double standard** and does not disengage companies from complying with the full legal framework of DRC.

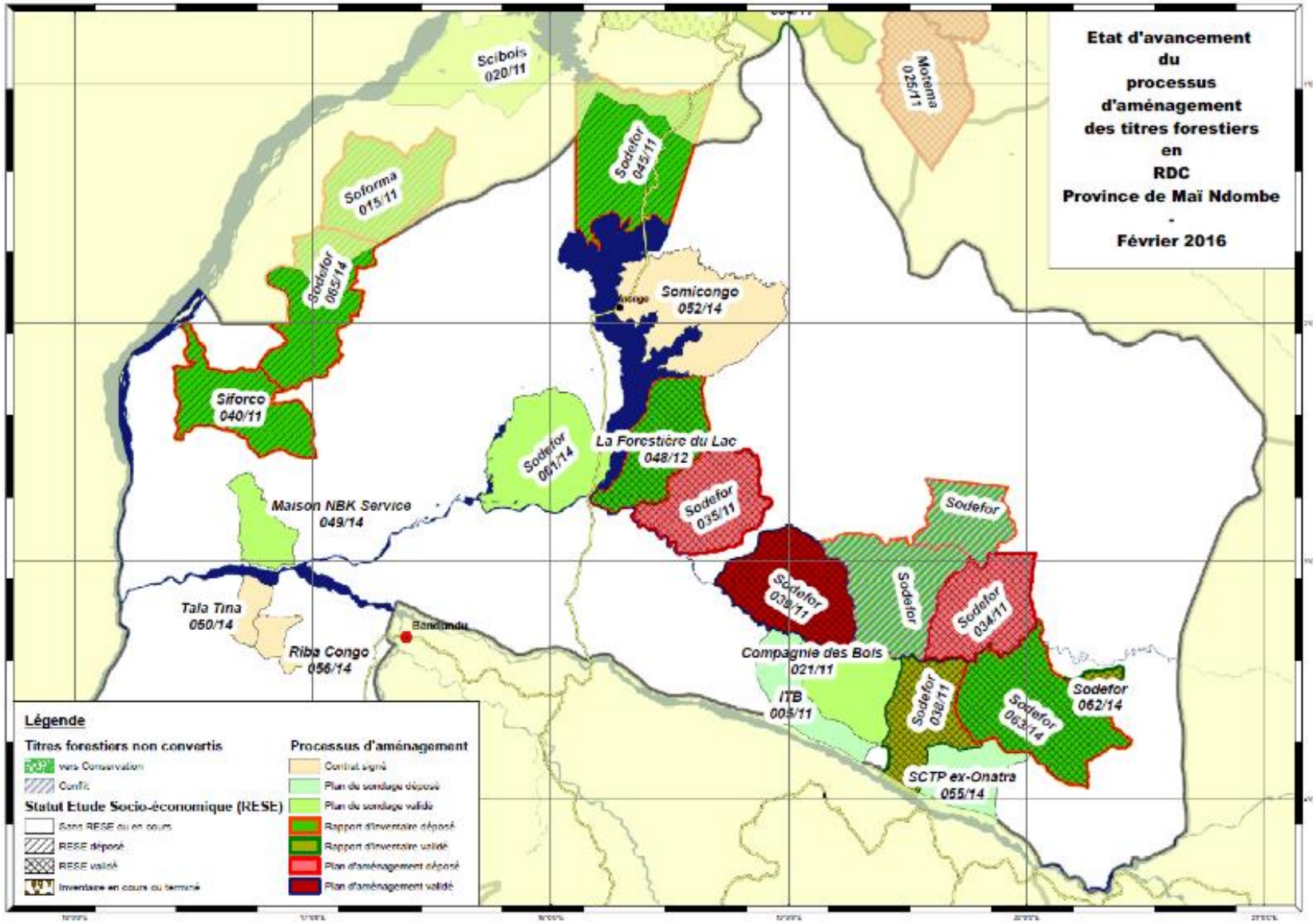
4/ Compliance monitoring

Concessions' rating and monitoring of concessions' compliance with the REDD+ standard will be performed **annually** by the ER program manager, within the broader context of REDD+ safeguards monitoring. Most data used to assess concessions' compliance are directly available from services of the Ministry of environment, and wan be completed by additional data collected through DCVI field control missions as well as by analysis of the civil society independent monitor.

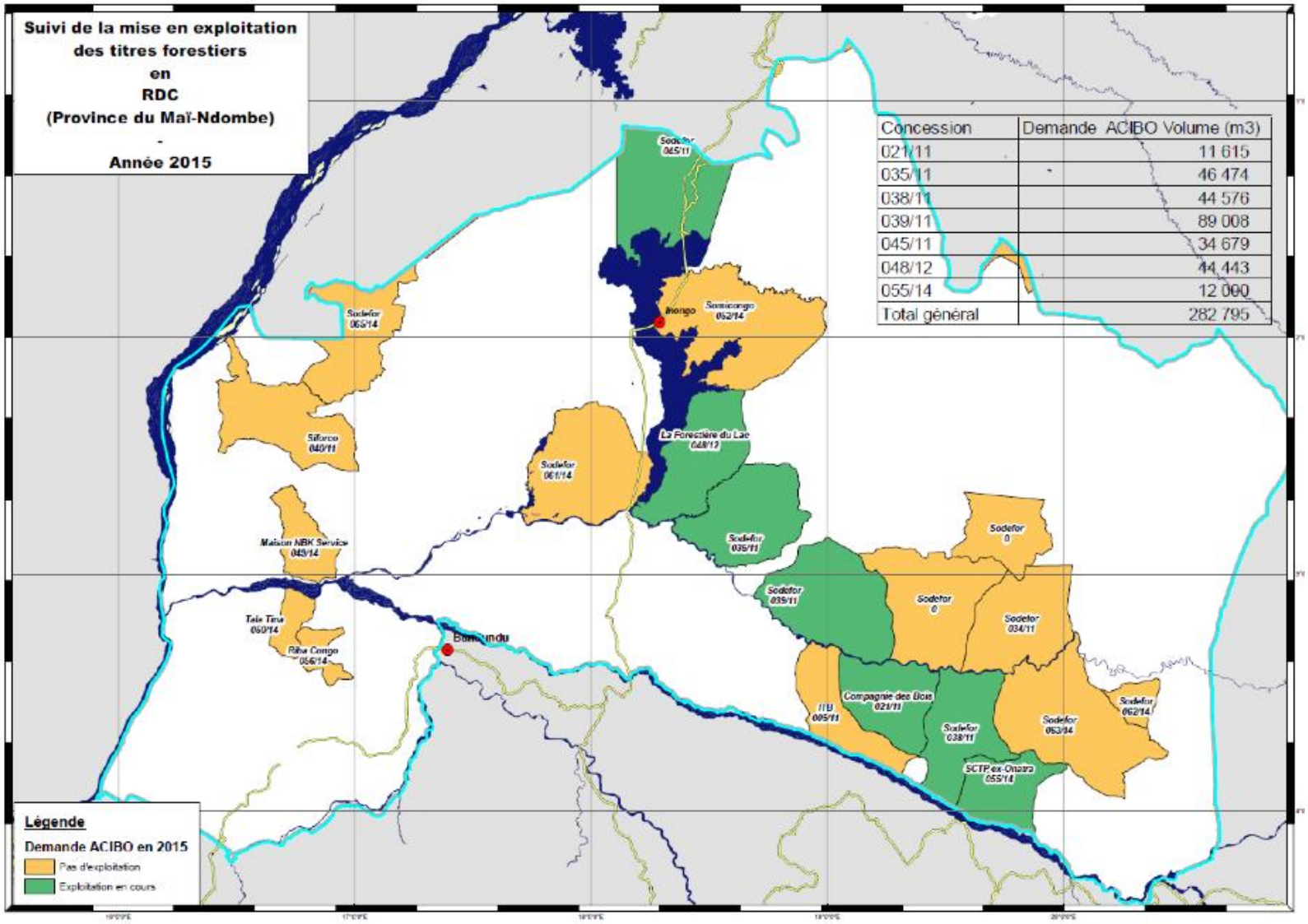
5/ Formal engagement of logging companies

Only companies that have formally engaged into the program, through the signature of a Letter of Intent, will be able to benefit from compliance support activities or will be able to develop REDD+ projects. Their compliance progress will be assessed annually.

Up to now, several logging companies as well as the industry's federation (FIB) have shown interest in engaging in the program. The engagement of logging companies in the Mai Ndombe program is an opportunity for them to demonstrate that they are committed to sustainable development and to value their progress towards greater legal compliance, in a difficult international and domestic business environment.



Map 6: Concession management process in the Mai Ndombe province. –February 2015 (Source: FRMi, 2016)



Map 7: Overview of logging operations in the Mai Ndombe province - 2015 (Source: FRMi, 2016)

Annex 8 Summary of Steps for Communication and Consultation within the Design of the ER Program

Dates et lieux	Atelier/ missions	Objectifs	Participants	Approches méthodologiques	Informations préalables détenues par les participants
2013 dans le district du Plateau	Missions du PIF	Information et consultation sur leProgramme d'Investissement Forestier	L'ensemble des parties prenantes de la société civile, du secteur privé et de l'administration du district du Plateau à travers plusieurs ateliers à Bolobo et Kwamouth.	• contacts individualisés avec certains acteurs ciblés, • Session d'information avec les membres de la société civile, du secteur privé et de l'administration du district du Plateau • Atelier de consultation et renforcement des capacités et de sensibilisation avec les délégués des CL et des Pade Bolobo et de Kwamouth, • Notes et divers messages d'information sur l'évolution du programme PIF	• Le RPP était bien avant présenté aux différentes catégories des parties prenantes et avait annoncé le PIF ainsi que les projets pilotes intégrés comme exemples d'investissement anticipés de la REDD+,
Mai 2014, à Bandundu ville	Première édition de l'Université de la REDD+ au Bandundu	Faciliter la compréhension et l'ancrage de la REDD+ ainsi que de ses interactions avec le processus APV-FLEGT dans la province du Bandundu	Une centaine de délégués provenant de l'administration provinciale, de la CN-REDD/FIP, de la Commission technique FLEGT, des projets pilotes, des exploitants industriels et artisanaux, du Conseil Consultatif des forêts, de la société civile internationale, nationale et provinciale, du secteur privé, des Conseils agricoles ruraux de Gestion, des représentants des communautés locales et des populations autochtones ont pris part à ces assises.	• Le Point Focal REDD en province de Bandundu avait sillonné les districts de la province annonçant pour préparer les différentes couches à l'avènement de l'Université sur modèle des Universités internationales REDD de Kinshasa • Appel à candidatures pour la participation à l'Université Provinciale REDD+ • Sélection des candidats • Sessions d'ateliers de renforcement des capacités • Sessions d'information sur les avancées du Processus National REDD, • Partage du rapport de l'université à travers le Point Focal provincial ;	• Contenu résumé des rapports des universités Internationales REDD de Kinshasa, • messages multimédia d'annonce de la tenue de l'Université
Octobre, Novembre 2014 dans le district du Mai-Ndombe	Mission BioCFplus pour la conception du PIREDD Mai-Ndombe	Prendre la mesure des problèmes et de leur évolution en lien avec le développement économique, les conditions de vie, la production agricole, les infrastructures rurales, la défense de l'environnement, la déforestation et le changement climatique.	Consultations dans une vingtaine de villages (environ 20 participants à chaque village) et quatre ateliers dans les chefs-lieux des territoires (entre 60 et 100 participants par atelier) de 3 à 4 jours réunissant l'ensemble des parties prenantes de la société civile, du secteur privé et de l'administration.	• Contacts individualisés avec certaines parties prenantes ciblés, • Consultation par focus group dans chaque village • Ateliers de renforcement des capacités des parties prenantes (société civile, secteur privé et administration)	• message d'annonce de la mission par CN REDD à travers le point focal provincial, • informations sur les accords signés entre le Ministère de l'environnement et la Banque Mondiale pour le PIF avec PIREDD Plateau, • Explication répandu dans la province par le MECNDD sur la possible extension du PIREDD dans leMai Ndombe.

Dates et lieux	Atelier/ missions	Objectifs	Participants	Approches méthodologiques	Informations préalables détenues par les participants
		Pour chacun de ces problèmes, des pistes de solutions, pratiques des projets en cours ou passés et priorités étaient évoquées et validées.			
Octobre 2014	Atelier de suivi de la conception du programme RE	Evaluer l'état d'avancement des travaux de groupe dans le cadre de la phase de la conception de l'ERPD.Recueillir les avis mais surtout contributions des parties prenantes aux travaux en cours	Total de 46 personnes, issues de l'Administration publique ; des ONG nationales et internationales ; du Secteur privé ; des Bailleurs et Partenaires Techniques & Financiers.	• mission de préparation de l'atelier par la CN REDD et Point focal ; • Atelier d'évaluation de l'état d'avancement des travaux de la conception de l'ERPD ave l'administration publique, ONG nationales et internationale, secteur privé et PTF • Récolte des avis et considération sur le document conceptuel en vue des améliorations • partage de restitution des éléments clés du rapport de la mission avec des groupes ciblés stratégiques ;	• Information sur l'acceptation par la Banque Mondiale /FCPF de la note d'idée sur le ERPD
Janvier-Février 2015, Bandundu-ville	Mission d'information CNREDD-WWF	Informer sur la mission d'Identification des représentants des CL/PA lors des activités de la « Phase de Conception » du Programme RE de la Zone Juridictionnelle de Mai-Ndombe	Autorités politico administratives et société civile. Total participants pour les deux cibles : une quarantaine	• préparation de l'atelier par le Point focal ; • Session d'information sur la mission d'identification des représentants des CL/PA dans le cadre de la phase de conception de l'ERPD	• information partagée sur l'engagement de la CN REDD à rédiger avec le concours des parties prenantes l'ERPD
Janvier-Février 2015 dans les 8 territoires du Mai-Ndombe	Missions de la société civile	Information sur le programme en conception, identification des représentants désignés des communautés et peuples autochtones	12 facilitateurs venus de Kinshasa chargés d'identifier 38 représentants de CL/PA, respectivement 19 titulaires et 19 suppléants	• AMI pour soumissionner; • passation de marché pour la réalisation de la mission à OCEAN ; • plusieurs séances de travail avec les différents groupes de travail de la CN REDD pour préparer la mission, • Mission d'identification des délégués des PA et CL pour prendre part à l'atelier national de lancement de la phase de conception du Programme de Mai-Ndombe, • séance de présentation des délégués désignés aux autorités territoires et signature des PV ;	• information partagée avec le groupe cible sur la nécessité d'impliquer les communautés locales et PA dans le processus de sensibilisation sur l'ERPD par le point focal REDD, • message de l'arrivée de la mission dans la Ville de Bandundu et civilités,
Février 2015, Bandundu-ville	Atelier de lancement de la conception du	Assurer l'ancrage communautaire et institutionnel de l'ER-Programme, faciliter l'appropriation et	Total participants : près de 250 personnes, , issues du gouvernement national et provincial, du parlement provincial, de l'Administration	mission préparatoire par la CN REDD à Bandundu Ville ; • séance de travail/ civilités et partage des enjeux de l'activité avec les notables et autorités de la province ;	• information partagée sur l'engagement de la CN REDD à rédiger avec le concours des parties prenantes l'ERPD

Dates et lieux	Atelier/ missions	Objectifs	Participants	Approches méthodologiques	Informations préalables détenues par les participants
	programme RE de Mai-Ndombe	susciter l'engagement de toutes les parties prenantes intéressées, en particuliers les parties prenantes provinciales	publique ; des ONG internationales, nationales, provinciales et locales ;du Secteur privé ; Bailleurs et PTF, l'Administration provinciale ;des Organisations de la société civile provinciale, organisations des exploitants industriels et artisanaux.	• Session d'informations sur le processus de mise en œuvre de l'ER-PROGRAMME • Atelier de renforcement des capacités sur les outils de mise en œuvre du programme • partage du rapport synthèse de l'atelier par les délégués désignés ;	
Février 2015, Bandundu-ville	Atelier sur la communication sur la REDD+	Formation des radios communautaires et représentants désignés de la société civile, des communautés locales et peuples autochtones	Total participants : 20 journalistes et relais communautaires identifiées	• Sélection des journalistes des radios communautaires de la Province de Bandundu ayant l'environnement pour spécialité Sélection des relais communautaires délégués par les communautés locales des territoires de Bandundu • Conception de modules de formations sur la REDD+, le changement climatique, le Programme ERPD et la communication sur la REDD (PowerPoint)	• information de l'annonce de la tenue de l'atelier par les délégués de la CN REDD et par les délégués des communautaires et PA ;
Mai 2015, Kinshasa	Atelier technique de conception du programme de Mai-Ndombe	Atelier technique sur l'état d'avancent de la rédaction duprogrammeERPDMai-Ndombe	Total de 35 personnes, issues de l'Administration publique ; des ONG nationales et internationales ; du Secteur privé ; des Bailleurs et PTF pendant 5 jours.	• séances préparatoires des différents groupes de travail de la CN REDD sur l'ERPD ; • contacts individualisés avec parties prenantespour expliquer en profondeur le processus de rédaction (administration provinciales, notables) • tenue de l'atelier avec les groupes spécifiques et experts de Washington de la Banque ; • restitution des conclusions de l'état d'avancement de la rédaction ;	• information sur les sections de rédaction des différentes parties du cadre méthodologique de rédaction de l'ERPD • message d'annonce de la tenue de l'atelier la CN REDD ;
Mai 2015, Bandundu-ville	Atelier derenforcementd es capacités des parties prenantes provinciales sur les sauvegardes	Formation de l'administration provinciale et représentants désignés de la société civile, des communautés locales et peuples autochtones	Total participants : près de 28 participants pendant 3 jours.	• mission préparatoire par le point focal REDD et WWF ; • Session d'information et de formation sur l'ER-PROGRAMME • rédaction participative d'une note synthèse en Lingala ; • séance de restitution à travers les territoires par les délégués désignés ;	• information sur les activités planifiées de renforcement des capacités des parties prenantes à l'ERPD ; • partage du rapport synthèse en français par internet ; • message d'annonce de la tenue de l'atelierla CN REDD ;
Octobre-Novembre 2015, Inongo	2ème Atelier derenforcementd es capacités des parties prenantes provinciales sur les sauvegardes	Formation de l'administration provinciale et représentants désignés de la société civile, des	Total participants : près de 104 participants pendant 4 jours.	• mission préparatoire par le point focal REDD et WWF ; • Session d'information et de formation sur l'ER-PROGRAMME • rédaction participative d'une note synthèse en Lingala ; • séance de restitution à travers les territoires par les délégués désignés ;	• information sur les activités planifiées de renforcement des capacités des parties prenantes à l'ERPD ; • partage du rapport synthèse en français par internet ; • message d'annonce de la tenue de l'atelierla CN REDD ;

Dates et lieux	Atelier/ missions	Objectifs	Participants	Approches méthodologiques	Informations préalables détenues par les participants
		communautés locales et peuples autochtones			
2 Avril 2016, Inongo	Atelier de validation des éléments clés des sauvegardes se suite aux observations du TAP sur l'ERPD Mai Ndombe	Permettre à toutes les parties prenantes de prendre connaissance et de se prononcer sur les éléments de réponse proposés aux questions du TAP, et assurer l'appropriation par les participants des outils de sauvegardes	Total participants : de 145 participants, réunis en une journée.	• Partages des observations du TAP sur les sauvegardes SES de ERPD en plénière, • Constitution des groupe de travail sur : (i) les peuples autochtones , (ii) les femmes et les jeunes , (iii) la société civiles , (iv) les exploitants artisanaux de bois , et (v) l'administration locale. • Partages de la matrice sur les risques et mesures d'atténuation ainsi • Décision des participants sur la gestion des risques de l'ERPD à travers des recommandations ; • Signatures du procès verbal de travail de groupes par les participants.	• message d'annonce de la tenue de l'atelier ; • partage de la suite des étapes à venir
4-5 Avril 2016, Inongo	Atelier de validation provinciale de l'ERPD de Mai Ndombe	Présenter les éléments clés du programme pour validation par les parties prenantes provinciales	Total participants : de 250 participants, réunis en deux jours, représentant toutes les parties prenantes engagées au programme RE de Mai Ndombe.	Ces deux journées ont été présidées par le Ministre national en charge de l'environnement ainsi que du vice-gouverneur de Mai-Ndombe. L'atelier a abordé les points suivants : • L'engagement des parties prenantes et la mise en exergue de l'importance de la communication dans l'appropriation du programme • Les explications sur les outils de mise en oeuvre et leur bien fondé. • La Présentation officielle du programme devant toutes les parties prenantes locales ; • La présentation de la vision du gouvernement provincialvis-à-vis du programme ; • La Présentation de la vision du Gouvernement central par rapport au programme; • Formulation des recommandations générales et validation du document ERPD	• message d'annonce de la tenue de l'atelier de Kinshasa ; • présentation des étapes à venir
11 Avril 2016, Kinshasa	Atelier de validation nationale de l'ERPD du Mai Ndombe	Présenter les éléments clés du programme pour validation par les parties prenantes nationales	Total participants : environ 100 participants, représentant toutes les parties prenantes engagées au programme RE de Mai Ndombe	Organisée en une journée, cette activité était co-présidée personnellement par le Ministre de l'ECN-DD et le Gouverneur de la province de Mai Ndombe. Il s'agissait essentiellement de présenter officiellement le document de programme en mettant en exergue : • l'Engagement des concessionnaires forestiers et des exploitants artisanauxdans le programme, • le processus de Consultation et participation de la société civile dans l'élaboration de l'ERPD • Les outils de mise en œuvre de l'ERPD	• Annonce des étapes (soumission et négociation de l'ERPA)

Dates et lieux	Atelier/ missions	Objectifs	Participants	Approches méthodologiques	Informations préalables détenues par les participants
				L'atelier s'est conclu avec la formulation des recommandations et à la validation officielle de l'ERPD pour soumission au Fonds Carbone.	

Annex 9 Roadmap for the operationalization of the National REDD+ Fund

DATES 2016	Evènements	Commentaires
23 mars	Lettre conjointe des Ministres des Finances et Environnement pour la mise en place du Secrétariat Intérimaire et validation de la feuille de route	Le PNUD a été choisie par le Gouvernement comme l'organisation internationale qui appuiera la mise en place du Secrétariat en utilisant les ressources du projet actuel REDD financé par la Norvège et disponible immédiatement.
8 avril	1ère Réunion d'information sur la feuille de route aux Organisations Participantes	Le calendrier étant court, les dates et différentes étapes seront expliquées à l'ensemble des partenaires concernés afin qu'ils puissent anticiper les étapes qui les concernent.
9 avril	**Lettre conjointe des Ministres de l'Environnement et des Finances pour la convocation du 1er Comité de Pilotage (COPIL)** au 6 mai et demande désignation des membres	Si le Décret du Premier Ministre n'est pas publié, la lettre conjointe convoquera un Comité de Pilotage extraordinaire ou intérim.
Du 27 avril au 6 mai	**Préparation du 1er CoPil** (28 avril réunion GIE)	Des réunions de préparations seront organisées par groupe représentatif afin de faciliter les nominations, et préparer les futurs membres.
29 avril	**Transmission des documents au Comité de Pilotage**	Les documents de référence seront transmis aux membres du Comité de Pilotage 8 jours avant la réunion afin de leur donner le temps de les consulter.
A compter du 6 mai (deux mois)	**Mise en place du pool d'évaluateurs indépendants – consultants nationaux et internationaux**	Afin de simplifier la procédure et d'utiliser une expertise existante, le pool de consultants internationaux de CAFI sera mis à profit.
9 mai	**1er Comité de pilotage du Fonds national REDD+**	Présentation des engagements pris dans le cadre de la Lettre d'Intention (LOI), la feuille de route et le lancement des Appels à Manifestation d'Intérêt.
9 au 20 mai	**Préparation des TDR des Appels à manifestation d'intérêt (AMI)**	Les TDRs pour les premiers AMI auront un format simplifié contenant les objectifs recherchés tirés du Plan d'investissement, les critères de revue qui seront appliqués ainsi que le format requis.
Semaine du 16 mai	**Réunion(s) d'information avec les organisations participantes** sur les critères	Les critères de sélection des projets ainsi que les formats requis tel que définis dans

	et orientations sur les formats requis pour les documents de projet et concept note (éligibles aux subventions de préparation)	le Manuel d'Opérations seront revus conjointement.
30 mai	**Réunion Extraordinaire du Comité de Pilotage**	Uniquement si nécessaire – optionnel en cas de demande d'une réunion additionnelle avant le lancement des AMI.
1er juin	**Lancement de l'AMI :** Deux formats de soumission seront proposés / Document de projet ou Concept Note	Pourront soumissionner aux appels à manifestation d'intérêt les Agences des NU, la BM et les Coopérations Internationales bilatérales. Cf Exigence posée par les TDRs de CAFI.
30 juin	**Clôture de l'AMI**	Une équipe du Secrétariat intérimaire sera disponible pour répondre à toutes questions techniques posées par les organisations internationales intéressées.
4 juillet	**Envoi des documents de projet aux évaluateurs et au Comité Technique avec grille de conformité et rapports d'analyse du Secrétariat Exécutif**	Les évaluateurs auront reçu un guide et le format attendu pour chaque évaluation. Deux évaluateurs indépendants (int+nat) seront assignés pour chaque AMI.
7 juillet	**1ère réunion du Comité Technique**	Réunion de préparation afin d'expliquer aux membres leur mandat.
18 juillet	**Réception des évaluations indépendantes**	Transmissions des rapports aux membres du Comité Technique et aux soumissionnaires.
1er août	**Demande de transfert de la tranche 2016 de CAFI au Fonds National conformément à l'échéancier prévu dans la LOI**	Le décaissement effectif s'effectuera dans un délai de 4 semaines soit au plus tard au 31 août.
25 juillet	**Réunion du Comité Technique**	Le Comité technique émet un avis sur les évaluations indépendantes et le classement proposé pour chaque AMI.
1er août	**Envoi des recommandations du Comité Technique aux soumissionnaires**	Chaque soumissionnaire aura l'opportunité d'effectuer des ajustements à sa proposition sur la base des recommandations contenues dans les rapports d'évaluation.
22 août	**Soumission des versions finales des notes conceptuelles**	Le secrétariat consolide les versions finales et prépare les dossiers pour leur soumission au Comité Technique
29 août	**Soumission des versions finales des Documents de programme par les soumissionnaires et transmission au Comité Technique**	Le secrétariat consolide les versions finales et prépare les dossiers pour leur soumission au Comité Technique.
2 septembre	**Envoi des rapports d'analyse préparé par Secrétariat Exécutif au Comité Technique**	

7 septembre	**Convocation du COPIL et transmission de l'ODJ**	Les documents sont circulés suffisamment en avance afin de laisser le temps aux membres du COPIL de les étudier.
9 septembre	**Réunion du Comité Technique pour revoir et valider les rapports d'analyse synthétiques et recommandation des soumissions**	
15 septembre	**Envoi au Comité de Pilotage des documents de programme et notes conceptuelles, avec les rapports** de synthèse sur les recommandations et l''ensemble des analyses jointes	Le Comité de Pilotage aura deux semaines pour consulter les documents.
15 au 21 septembre	**réunions ad hoc de préparation du Comité de Pilotage**	Incluant les parties prenantes au Comité de Pilotage : bailleurs, ministères, société civile etc.
29 septembre	**Réunion du COPIL validation des programmes prioritaires (4 ou 5 programmes) et de 2-3 Subventions de Préparation, et validation du lancement second AMI**	Décision d'approbation du montant accordé et de la tranche initiale à décaisser.
10 octobre (date indicative)	**Lancement du second appel à manifestation d'intérêt**	Les programmes restants du portefeuille du Fonds feront l'objet d'un appel à manifestation d'intérêt, et les programmes sujets au 1er AMI n'ayant pas obtenu de réponse satisfaisante seront relancés.
1er novembre	**Décaissement effectif aux Organisations sélectionnées**	Sur la base du compte rendu de la réunion du comité de pilotage et la signature du document de projet par le Président du Comité de Pilotage et l'Organisation sélectionnée.

Annex 10 Terms of Reference of the Program management unit

These terms of reference and methods of contract implementation will be presented in the coming months to Mai-Ndombe institutions, in order to be ratified by the provincial assembly and/or the program Steering Committee.

1. Roles of the Program management unit

The Program management unit, based in the capital of the province of Mai-Ndombe (Inongo), will be responsible for (i) the administrative and financial management, (ii) strategic and technical coordination, (iii) carbon and non-carbon reporting and (iv) the marketing program. The aim is for this function to be fully integrated into the provincial government in the medium term.

2. Organizational and Contractual Reports

- The Program management unit will be the executing agency of the program and will sign a service provider agreement with the government of DRC.
- The Program management unit will be hired by the government of DRC (through FIP Coordination Unit for example) on a competitive basis. It will be a firm or a consortium with multiple tracked and recognized skills in order to tackle the challenge of this innovative program.
- The ERPA could stipulate the Program management unit's responsibility in the implementation of the program. A portion of the Carbon Fund payments should be allocated directly to the Program management unit.
- The Program management unit will act under the control of the provincial government and the Steering Committee of the program made up of all stakeholders. Its plans and budget will be validated at least once a year by the Steering Committee.
- The Program management unit will ensure coordination and the contractual interface with the implementing agencies and operators (international and local NGOs, companies, cooperatives, etc.) to implement the program strategy, ensure monitoring and evaluation, as well as revenue sharing in accordance with the profit sharing plan that will be attached as an annex to the ERPA.
- The Program management unit, signed by the Province, will prepare the various sub-contracts then the payments will be executed by the Program management unit under the terms of the contracts.

3. Specific Functions and Tasks

Administrative and Financial Function.

a. Managing the administrative interface with the Carbon Fund;
b. Concluding and managing contracts with the various project intermediaries (local implementing agencies, project promoters and large nested project supporters);

c. Procurement and financial management of the Advance payment from the Carbon Fund (it include key complementary activities, consultation, communication, operation of the FGRM and monitoring).
d. Monitoring technical and financial assessment of the Local Executive Agencies and project supporters funded by the program;
e. Making payments for nested projects based on carbon results;
f. Checking by sampling proxy measures and making payments to beneficiaries (communities, dealers, companies) project performance;
g. Managing the program operating funds.

Technical and Strategic Function

a. Compiling the monitoring reports on emissions reduction and monitoring of safeguards and co-benefits, ensuring compliance methodological frameworks adopted and the technical interface with the auditors;
b. Developing partnerships with donors, government agencies, private stakeholders, and civil society to implement the strategy of the program and ensure proper alignment of private and public funding;
c. Supporting the government and the province to attract public and private investors and to sell the emission reduction credits generated.
d. Proposing strategic reinvestment plans for the program of working capital based on the sustainable development plans set up at territory level.

Annex 11 Execution agencies responsible for implementing the enabling activities for the program

Functions	**Responsibilities**	**Implementing agencies (potential)**	**Types of contracts**
Plateau local executing agency	Governance, territory planning, land and community investments	WWF (recruited by the FIP with direct agreement)	Delegated project management contract with UC-FIP
Mai-Ndombe local executing agency		International NGOs recruited in a competitive invitation to tender	Delegated project management contract with the Program management unit or UC-PIF
Specialized Operators	Family Planning	Local NGO in competitive invitation to tender	Delegated project management contract with the Program management unit or UC-PIF
	Support for the value chains of perennial crops	Company or NGO (Café Africa, Trias...)	Delegated project management contract with the Program management unit or UC-PIF
	Support for the Wood Energy Sector	(SNV)	Delegated project management contract with the Program management unit or UC-PIF
	Support in compliance and weak exploitation impact by concession holders	(FRM)	
	Support for the development of community forestry	International or national NGOs (GIZ...)	
State Services	Strengthening of forest and wildlife law enforcement	State services (environmental service squads, DCVI...)	Protocol of Agreement

Annex 12 Summary of responsibilities of the entities in relation to monitoring, evaluation and management of grievance and redress

Entities	Measurement and reporting of emission reductions (ER)	Monitoring of safeguards and non-carbon benefits	Management of complaints and appeals
Ministry of Environment	• Validation and certification of credits generated based on the national audit performed with the support of the DDD and DIAF • National MRV consistency verification	• Analysis of screening grids, approval of PGES • Conducts audits by samples, particularly in case of independent complaints or warnings • Establishes, if necessary, sanctions (reduction of credits generated	• Monitoring of the correct handling of complaints and actions, if necessary with a site visit
Provincial REDD+ Steering Committee	• Validation of ER report	• Validating the monitoring report on safeguards and co-benefits	• Provincial analysis of complaints (transfer to the next level or to the legal system if applicable)
Program management unit	• Compilation of the monitoring report of ERs based on data provided by the operators • Satellite monitoring of deforestation/degradation and fires • Quality control of transmitted data	• Compilation the monitoring report on safeguards and co-benefits	• Provides information on related complaints • Monitors the provincial resolution of complaints
Implementing agencies	• Compilation of data from operators under its management • Support for field verification	• Filling screening grids, PGES proposal for projects under its responsibility • Monitoring of safeguards and co-benefits	• Provides information on related complaints • Monitors the local resolution of complaints
Project developers	• Monitoring and reporting of activity indicators (ha reforested or used for grazing, reduced impact exploitation parameters, etc.)	• Filling screening grids and PGES proposal if necessary • Monitoring of prescribed safeguard measures	• Provides information on related complaints
Decentralized services	• Checking the activity indicators by conducting site visit	• Verification of the application of the safeguards measures by performing site visit • Monitoring of safeguards and co-benefits	• Monitors the effective implementation of corrective actions
Multi party local councils (CART)		• Monitoring of safeguards and co-benefits • Approval of participatory land use maps and sustainable development plans	• Local analysis of complaints (transfer to the next level or to the legal system if applicable)
Civil society/Local Observers	• Identification of stakeholders in deforestation and degradation	• Independent monitoring of the performance of project supporters	• Issuing of complaints • Monitoring and control of the mechanism and the implementation of decisions
Mandated independent observers	• Timely organization of field missions and creation of reports on the DD players by compiling information provided by local OSCs	• Timely organization of field missions and creation of reports on the implementation of SSE	• Timely organization of field missions and creation of reports on the management of complaints mechanisms
MOABI	• Providing a platform for compiling information • Training in the use of Moabi technology to collect field data and display it on an independent platform (cell phones, tablets, website)		

Annex 13 Social and Environmental risks and mitigation analysis of the ER-Program

(WORK IN PROGRESS)

Pillar	**Agriculture**		
Activity	**Risks or negative impacts**	**Mitigation measures**	**Implementation**
AS1. Agroforestry and improvement of cultivation techniques	• Bouncing effect due to ameliorated subsistence crops. Risk to increase interest in agricultural production in forest and attract migrants	• Participatory mapping work/ local land-use plan in order to identify agricultural development zones; • Support towards local organization so they can control extension of cultivated area	Designated LEAs, CARG and CLD
	• Risk of reassignment of land around villages and towns, thereby depriving access to subsistence crops culture to most vulnerable people	• Agroforestry plantation possible only at from certain distance of villages and towns (3-5km depending of situation). To be included in operational plan for development and evaluation of PGES. • Particular case (within 3 km) are subject to Environmental and Social Management Plan (ESMP)	Designated LEAs, CARG and CLD
	• Increased land conflict due to valorization of lands which were previously unused (savannahs).	• Participatory mapping work/ local land-use plan in order to identify agricultural development zones; • Support given to CARGs and conflict prevention and resolution mechanisms; • Agricultural support given to rural households through targeted structures. • Land tenure security process. • Application of Free, Prior and Informed Consent Guidelines	Designated LEAs, CARG and CLD
	• Increased agricultural production from households that increases child, women, and indigenous people labor (and labor with inadequate worker protection).	• Support of processing and conservation of agricultural products at the household level to reduce workload • Support for collective discussion of gender issues in agricultural production.	Designated Local Executing Agencies (LEA) and Program Management Unit.

		• Support for collective discussion on the labour wages • In contract with entities that employ workers: interdiction of child work and requirement for written contracts respecting minimum wage	
	• Increasing agricultural production, according to Mai Ndombe community delegates, will not only focus interest on Mai Ndombe, with probable increase of crop thefts, especially in riverside fields of more populated areas and those near roads, but may also increase commercial traffic and its negative consequences.	• Support of High Intensity Labor Force activities, providing more employment opportunities respecting minimum wage for local unemployed youth; • Increasing monitoring measures in villages facing potential illegal intruders.	Designated LEAs, CARG and CLD
AS2. Perennial crops development in non-forest areas (coffee, cocoa, palm oil and rubber)	• If fallow lands or rehabilitated former concessions are depleted, there is a risk of new buyers moving out to primary forests in search of higher yields, this would endanger the program.	• Awareness raising among perennial crop farmers to adhere to the ER Program performance contract; • Development of agricultural registries while following the rural territorial planning master plans at the provincial level. • Participatory local land use plans developed and respected	Designated LEAs, CARG and CLD
	• Appearance of work conflict with development of agricultural wage labor • Concurrency between wage labor and subsistence production for food security	• Include in contracts enforcement of labor law for agricultural companies using wage labor: minimum wage, social and termination insurance… • Impose in project design the integration of social measures toward workers residences, access to health care and education. • In the ER program contracts, include land plots for family agriculture around the plantations • Promote partnership encouraging perennial crops family production on their own land with purchase agreement. • Promote local labor recruitment to facilitate family access to land.	Designated LEAs, CARG and CLD to verify contract terms and monitor its application

	• Fluctuations in carbon markets (or lack of continuity in the donor grants) could compromise continued intervention efforts in perennial crops and make agents vulnerable to unemployment before the production of fruit trees. • Fluctuation on the international market prices could also expose farmers to unemployment;	• Ensure that maintenance of plantation are financed through secured funds and protected from carbon markets fluctuation. (ERPA with a fix price mitigate this risk) • Limit the size of plantation to reduce the impact of market fluctuation • Promote marketing of perennial crops products through fair trade scheme in order to guarantee minimum prices during low demand period • Promote large and transparent information about local and global prices in agricultural markets in order to avoid abuse from purchasers.	ER Program Steering Committee and Program management unit
	• Biodiversity reduction in area of perennial crops development (Reduction of crops diversity and bush meat hunting)	• Introduction of caterpillar trees in households plantations and around industrial plantation • Make support conditional to the respect of hunting calendar. Control sale and consumption of bushmeat	LEAs and NGOs designated for the task.
AH1. Strengthening agricultural value chains	• Influx of agricultural products in local markets could cause decrease in prices and reduce production profitability	• Carry out collective investments (roads, bridges…) that will reduce transportation cost in order to better resist and adapt to low prices period. • Carry out investments in value chain that will allow reducing intermediary costs (transformation, informal taxes..) in order to maintain reasonable prices during low prices periods.	LEAs and NGOs designated for the task.
Pillar	**Energy**		
Activity	• Risks or negative impacts	• Mitigation measures	**Implementation**
ES1. Assisted natural regeneration for	• Vegetal biodiversity and NTFPs could be reduced, especially with the large introduction of Acacia to accelerate regrowth	• Promote diversification of species through environmental education • Include criteria on diversification of species in the contract terms	PMU, designated LEAs and NGOs

charcoal production. **ES2. Afforestation/ Reforestation for charcoal production**	• Risk that formal and unforma taxes on charcoal and its production are focusing on program plantation instead of illegal non-sustainable charcoal making	• Advocacy with governmental bodies (central and provincial level) to develop a rationalized charcoal taxation regime including consideration for sustainable practices and their costs. • Reinforce administration capacity to control charcoal making in natural environment in order to ensure equal taxation regime	PMU,Designated LEAs and NGOs, Provincial Steering committee
	• Savannah protection for natural regeneration or plantation will limit access to some resources (aftermath grazing after fire in dry season for breeders, products of hunting using fire)	• Awareness about the gains of plantation/regeneration that compensate largely the losses (biodiversity will increase, charcoal production) • Ensure that local development plan and contracts doesn't allocate for plantation the full area currently used for grazing	Designated LEAs and NGOs.
Pillar	**Forest**		
Activity	• Risks or negative impacts	• Mitigation measures	**Implementation**
FS1. Reduced impact logging	• Disturbance of biodiversity/ relocation of certain animal species, increasing hunting following industrial logging despite being low-impact. • Absence of local product processing companies does not stimulate local communities and Indigenous Peoples to respect forest-logging laws.	• Joint evaluation (NGOs, LEAs, Forest companies, Environment administration) of major environmental risks of logging and application of Environmental and Social Management Plan for all concessions engaged in the ER-Program • Encouragement of timber industries to set up processing units and professional timber sector training schools in the ER Program area in order to train artisanal loggers and other potential workforce in the area.	Steering Committee, Program Management Unit, environmental administration.
FS2. Conservation of local community forests	• Community forest conservation areas will modify the current land and resources uses of local communities and Indigenous Peoples.	• Application of FPIC guidelines (including participatory mapping, development of a Sustainable Development Plan, contract negotiation)	Designated LEAs and NGOs.
FS3. Conservation concession	• Risk of non-performance and/or lack of Emission Reduction buyers could lead to incapacity from the companies to fulfill its commitments toward local population	• Contracts with companies engaged in conservation concession should consider risk of non performance and/or lack of ER buyers in order to provide some financial guarantees • Support companies to invest in alternatives revenues than Carbon as Ecotourism for example	Program Management Unit, Provincial government and administration of

	(collective infrastructure and revenues sharing) • Risk that conservation areas delimitation doesn't take in account sufficiently local population farmland needs	• Ensure that company's commitments are feasible, realistic and aligned with existing Cahier des charges of logging activities. • Ensure that a participatory mapping process involving all stakeholders of the concession areas take place prior to definition of conservation areas and contract negotiation with the government	the Environmental Ministry.
FH1. Strengthening forest and wildlife law enforcement	• Support to administration will be limited and targeted. It could create internal conflict within local administration and different behavior with respect to operators that will be controlled	• Development of specific code of conduct for forest management agents. • Ensure that the Grievance and Redress mechanism is operational and allow stakeholders to report on bad practices by administrative agents • Regular diagnosis at CART level of administration operation, success and failures	Program Management, Administration of the Environmental Ministry.
FH3. Development of community forestry.	• Risk of conflict between stakeholders regarding the application of recent regulation on community forestry. • Risk of only focusing on timber production in community forestry, while NTFPs are also important products (for subsistence and business)	• Promotion of joint consultation of stakeholders on application and vulgarization of the decree on communities forests concession measures. • Supporting identification and development of targeted NTFPs.	designated LEAs and NGOs. CLDs, CARGs
Pillar	**Governance, Land-Use and Land-Tenure Planning**		
Activity	• Risks or negative impacts	• Mitigation measures	**Implementation**
H2. Multi-level capacity-building and Sustainable Development Plans design	• Risk that Sustainable Development Plans (SDPs) doesn't take sufficiently in account Indigenous Pygmy Peoples and their economic and cultural features • Risk that SDPs doesn't take sufficiently take in account vulnerable groups	• The program will encourage the enactment of a provincial law (edit provincial) to validate the SDPs and make them binding on third parties. This provincial law will provide the framework to ensure that SDPs have been elaborated with the fair participation of all and include a complete description of all users rights. The provincial law would impose that all users rights are clearly mentioned in the SDP and that any future modification in the	Designated LEAs and NGOs. CLDs

	• Risk that SDPs doesn't take sufficiently take in account future population farmland needs • Risk that internal conflicts in CARTs and CLDs counteract the implementation of this SDPs	land allocation requires the Free Prior and Inform Consent of all the affected users, including Indigenous People. • Create specific associative structure for IPPs and ensure the participation of their representatives in the CLDs and CARTs • Realize or include existing Indigenous Peoples Development Plan into SDPs (as requested by the REDD+ CGES) • Realize regular participatory evaluation of SDPs design and implementation to prevent conflict and improve the plans	

Annex 14 Specific analysis on roles and interests of key social group (women, youth, and Indigenous Pygmy Peoples) in relation to the key co-benefits generated by the program

Women			
Key co-benefits	**Current state**	**Program objectives toward the social group**	**Cultural feasibility**
Revenues	• Average household revenues between 400 and 600 dollars • Women control monetary revenues of the households • Product transformation mostly done by women • Women's work >10hour/day • Men in charge of commercialization control revenues • Non-monetary revenues strongly linked with women	• Improved vegetal material (cassava, peanut, maize) can increase women productivity of 30 to 50% and potential their revenues and household food security • Support crops controlled by women as peanuts • Ensure that at least 20% of agroforestry areas are in savannah managed by women • Increase households revenues of 20%	• Women already implement part of the activities that the program will support. • Women already involved in households revenues generation and management • Strong demand and women expectation towards development of agricultural products mechanical transformation • Currently, a strong monetization of household economy is observed.
Socio-economic investments	• Lack of any transformation material increase women's work • Transportation constraints lead to negative impact on prices and revenues from agricultural products.	• 10 Small-scale private operators per Territoire equipped with mills and huskers in order to reduce women workload (Beneficiaries: 300 women per equipment, 24 000 women) • Women benefit from agricultural product prices increase thanks to road rehabilitation and access to market.	
Capacity building and governance	• Very few women association • Very few women in local organization, dominated by men.	• One women organization per Terroir • Representatives of this association participate in local development committee and in CART • Representatives of women organization in decision-making and implementation entities of the program	
Environmental co-benefits	• Women are main pickers of NTPF	• Savannah and forest protection increase or maintain biodiversity and opportunity for NTPF picking, increasing food security and women revenues	

Young people			
Key co-benefits	**Current state**	**Program objectives toward the social group**	**Cultural feasibility**
Revenues	• Current resources of youths come from forest utilization (field preparation, charcoal) • Rarity of salary work	• At least 20% of agroforestry area managed by youths • At least 30% of fruit plantation (incl. palm, coffee, cocoa, others) managed by youths	• Youths are looking for short-term revenues (charcoal). Need for awareness for medium/long-term profit through plantation • Strong expectations towards salary and daily job
Socio-economic investments	• Youths are main transporters (bicycle, boats…) and take all risks due to bad roads condition and navigation hazards	• Main roads will be maintained during the program implementation, waterways will be buoyed • Security and speed of transport will be improved • Encourage job creation for youths through transformation equipment's	
Capacity building and governance	• Very few growers organization in the province • Weak participation of youth into Local development council	• At least half of the seed multiplication units are managed by youth • Youth elect their representatives in local development councils	
Environmental co-benefits	• Youths and child's are main responsible of savannah fire (for hunting)	• Develop alternative source of revenues and proteins through agroforestry plantations and improved practices in forest	

Indigenous Pygmy Peoples			
Key co-benefits	**Current state**	**Program objectives toward the social group**	**Cultural feasibility**
Revenues	• Strong income inequality between territories to the detriment of Indigenous Pygmy Peoples	• Agricultural workforce price harmonized among the province • Communities and indigenous people equitably beneficiary of the program supports. • Income management training towards indigenous people • Half of Indigenous Pygmy Peoples villages received apiculture training and equipment • Access to land is equitably and sustainably addressed to the benefit of local communities and Indigenous Pygmy Peoples	• Strong demand from Indigenous Pygmy Peoples to access to same rights than other communities • Proven capacity for Indigenous Pygmy Peoples to organise themselves (i.e. REPALEF) • Strong capacity to conserve traditional customary also
Socio-economic investments	• Indigenous Pygmy Peoples access to public services is discriminated by money	• Training about benefits from education and health services to indigenous people • At least 5 Indigenous Pygmy Peoples groups received support to create micro-enterprise (product transformation, apiculture, sawing) • Equitable participation of indigenous people and communities in design and implementation of socio economic investment planned by the program	
Capacity building and governance	• Indigenous Pygmy Peoples are well organized nationally by the REPALEF network but lack of organization at the local level	• Each village with Indigenous Pygmy Peoples population will include a specific LDC for indigenous	
Environmental co-benefits	• Indigenous Pygmy Peoples (as other communities) doesn't respect hunting calendar neither prohibited animals as big monkeys, bats	• Training to educate on the benefit of respecting hunting calendar for their own interests • Awareness on Ebola risks and others contagious sickness in relation with venison • Increased control in local and regional markets	

Annex 15 Imagery used for REL Calculation

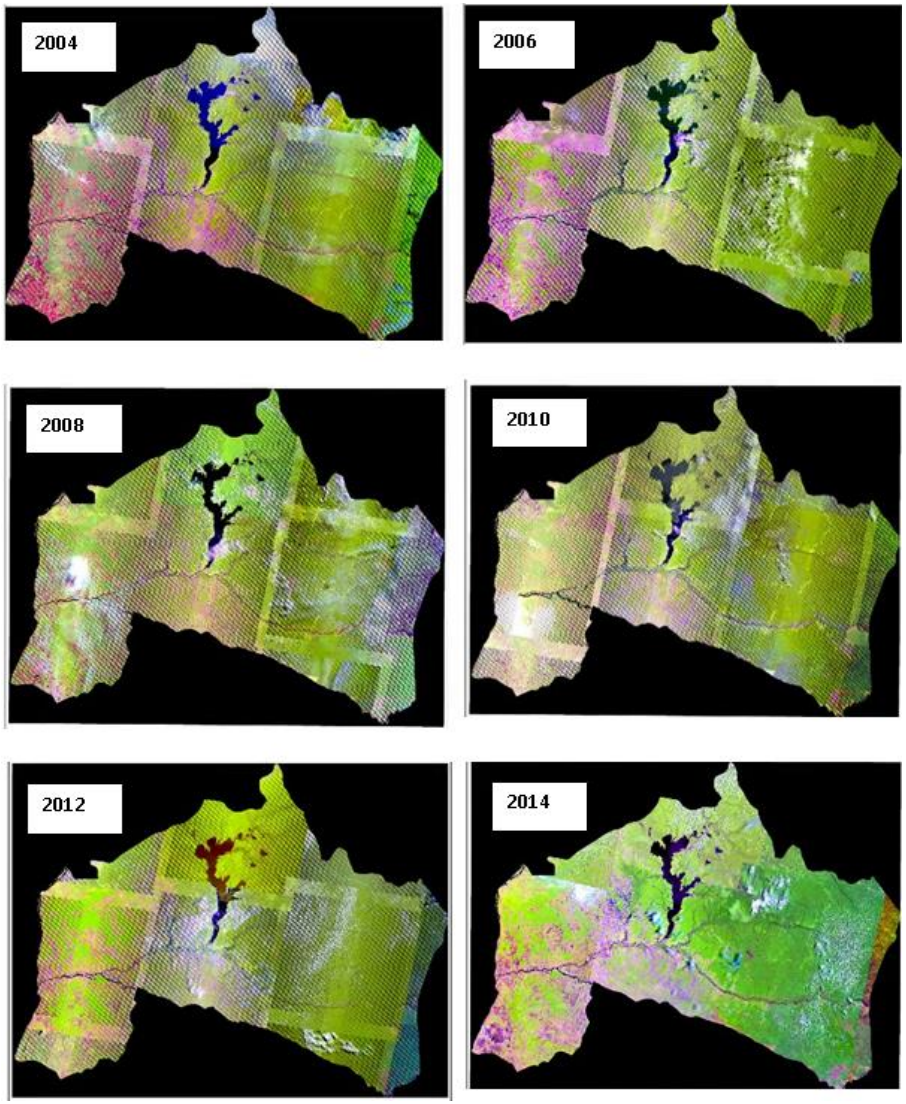


Figure 25: Mosaicked Imagery used for the REL Calculation

Path	Row	Filename	Year	Date Acquired	Sensor/Instr.	
2004						
178	62	LE71780622004133ASN01	2004	12-May	Landsat ETM+	7
178	63	LE71780632004133ASN01	2004	12-May	Landsat ETM+	7
179	61	LE71790612004268ASN01	2004	24-Sep	Landsat ETM+	7
179	62	LE71790622004204ASN01	2004	22-Jul	Landsat ETM+	7
179	63	LE71790632004204ASN01	2004	22-Jul	Landsat ETM+	7
180	61	LE71800612004195ASN01	2004	13-Jul	Landsat ETM+	7
180	62	LE71800622004195ASN01	2004	13-Jul	Landsat ETM+	7
181	61	LE71810612004026ASN01	2004	26-Jan	Landsat ETM+	7
181	62	LE71810622004170ASN01	2004	18-Jun	Landsat ETM+	7
181	63	LE71810632004170ASN01	2004	18-Jun	Landsat ETM+	7
2006						
178	62	LE71780622006106ASN00	2006	16-Apr	Landsat ETM+	7
178	63	LE71780632006074ASN00	2006	15-Mar	Landsat ETM+	7
179	61	LE71790612006033ASN00	2006	2-Feb	Landsat ETM+	7
179	62	LE71790622006017ASN00	2006	17-Jan	Landsat ETM+	7
179	63	LE71790632006257ASN00	2006	14-Sep	Landsat ETM+	7
180	61	LE71800612006024ASN00	2006	24-Jan	Landsat ETM+	7
180	62	LE71800622006024ASN01	2006	24-Jan	Landsat ETM+	7
181	61	LE71810612006175ASN00	2006	24-Jun	Landsat ETM+	7
181	62	LE71810622006191ASN00	2006	10-Jul	Landsat ETM+	7
181	63	LE71810632006159ASN00	2006	8-Jun	Landsat ETM+	7
2008						
178	62	LE71780622008064ASN00	2008	4-Mar	Landsat ETM+	7
178	63	LE71780632008064ASN00	2008	4-Mar	Landsat ETM+	7
179	61	LE71790612008167ASN00	2008	15-Jun	Landsat ETM+	7
179	62	LE71790622008183ASN00	2008	1-Jul	Landsat ETM+	7
179	63	LE71790632008167ASN00	2008	15-Jun	Landsat ETM+	7
180	61	LE71800612008270ASN00	2008	26-Sep	Landsat ETM+	7
180	62	LE71800622008270ASN00	2008	26-Sep	Landsat ETM+	7
181	61	LE71810612008165ASN00	2008	13-Jun	Landsat ETM+	7
181	62	LE71810622008181ASN00	2008	29-Jun	Landsat ETM+	7
181	63	LE71810632008181ASN00	2008	29-Jun	Landsat ETM+	7
2010						
178	62	LE71780622010229ASN00	2010	17-Aug	Landsat ETM+	7
178	63	LE71780632010069ASN00	2010	10-Mar	Landsat ETM+	7
179	61	LE71790612010140ASN00	2010	20-May	Landsat ETM+	7
179	62	LE71790622010140ASN00	2010	20-May	Landsat ETM+	7
179	63	LE71790632010140ASN00	2010	20-May	Landsat ETM+	7
180	61	LE71800612010131ASN00	2010	11-May	Landsat ETM+	7
180	62	LE71800622010115ASN00	2010	25-Apr	Landsat ETM+	7
181	61	LE71810612010090ASN00	2010	31-Mar	Landsat ETM+	7
181	62	LE71810622010090ASN00	2010	31-Mar	Landsat ETM+	7
181	63	LE71810632010138ASN00	2010	18-Mar	Landsat ETM+	7
2012						
178	62	LE71780622012315ASN00	2012	10-Nov	Landsat ETM+	7
178	63	LE71780632012203ASN00	2012	21-Jul	Landsat ETM+	7
179	61	LE71790612012082ASN00	2012	22-Mar	Landsat ETM+	7
179	62	LE71790622012274ASN00	2012	30-Sep	Landsat ETM+	7
179	63	LE71790632012178ASN00	2012	26-Jun	Landsat ETM+	7
180	61	LE71800612012025ASN00	2012	25-Jan	Landsat ETM+	7
180	62	LE71800622012057ASN00	2012	26-Feb	Landsat ETM+	7
181	61	LE71810612012192ASN00	2012	10-Jul	Landsat ETM+	7
181	62	LE71810622012240ASN00	2012	27-Aug	Landsat ETM+	7
181	63	LE71810632012320ASN00	2012	15-Nov	Landsat ETM+	7
2014						
178	62	LC81780622014216LGN00	2014	4-Aug	Landsat 8 OLI	
178	63	LC81780632014184LGN00	2014	3-Jul	Landsat 8 OLI	
179	61	LC81790612014271LGN00	2014	28-Sep	Landsat 8 OLI	
179	62	LC81790622014255LGN00	2014	12-Sep	Landsat 8 OLI	
179	63	LC81790632014255LGN00	2014	12-Sep	Landsat 8 OLI	
180	61	LC81800612014278LGN00	2014	5-Oct	Landsat 8 OLI	
180	62	LC81800622014278LGN00	2014	5-Oct	Landsat 8 OLI	
181	61	LC81810612014237LGN00	2014	25-Aug	Landsat 8 OLI	
181	62	LC81810622014221LGN00	2014	9-Aug	Landsat 8 OLI	
181	63	LC81810632014237LGN00	2014	25-Aug	Landsat 8 OLI	

Annex 16 Capacity Building at OSFAC / UniKIN

The following Table 55 provides names and qualifications of experts that conducted the REL change detection.

Table 51: Analyst Roster for sample classification exercise – Mai Ndombe ER-Program

Name	Family (Post)-Name	First (Given) Name	Qualifications
MAKONGA	MILOLO	Lise-Olga	IngénieurAgronome (BSc)
NKAMBU	MATOKO	Grace	IngénieurAgronome (BSc)
NGALULA	KANKONDE	Judith	IngénieurAgronome
MABIBI	LUVAMBUKU	Pitshou	Ingénieur Agronome en Eaux et Forêts (BSc)
MALONGA	NKUNKU	Bardely	IngénieurAgronome (BSc)
LIKONGA	LOLEKE	Serge	IngénieurAgronome (BSc)
NKITUAHANGA	YENAMAU	Arsène	IngénieurAgronome (BSc)
KAKOBA	KATULUISHI	Paul	IngénieurAgronome
BANGELESA	FEFE	Freddy	IngénieurAgronome (BSc)
IKAMA	MATSILI	Farel	IngénieurAgronome (BSc)
EBENGO	MWAMPONGO	Dav	IngénieurAgronome (BSc)
MIALA	MIANSA	Timothée	IngénieurAgronome

Analysts in the training session (left) and on the final day of training (right) about to start classification

Figure 26: Classification "Dashboard" provided to the analyst team as a reference for choosing land cover classes

IPCC LC Classes	Primary Forest	Secondary Forest	Grassland	Cropland	Bare Soil	Burn Scar	Wetland / Water	Settlement	Other
Type	Forest	Forest	Non Forest	Non Forest	Non Forest	Non Forest	Non Forest	Non Forest	Non Forest
COLOR (Typical)	Dark Green to Medium Green	Yellowish, Light Green	Bluish Green (teal), Slightly Brown	Mixture of Red / Purple and Bright Green	Light Red/Purple	Dark or to lighter Purple		Purple/grey representing villages, structures, etc.	Black (No image) White (Clouds) Black (Shadow)
TEXTURE	*Irregularpattern of rough vegetation (Broccoli)	Variable roughness (irregular pattern)	Smooth	Mosaic/ Patchy. *Rows of crops, fields visible	Smooth	Smooth	Smoother	*Rough/ Patchy	
CONTEXT / ATTRIBUTES	* Tends to exist in large patches * Appears taller (look for oblique shadows)	* Tends to be surrounded/ near Primary Forest * Often Surrounds or is in mosaic with Non Forest * Histogram equalising helps to draw out Secondary Forest (delineate from Primary Forest) * Progression from Primary Forest to Secondary Forest, Non Forest	* Also Tends to be large patterns *Smooth * Very distinct boundaries *Can be anything from light Green to Greyish Green	* Rows of Crops planted often visible * Tends to be surrounded by Secondary Forest or fallow soil * Mosaic of planted / fallow fields visible			* Often difficult to identify (Ask Yuni/ Jeremy/ JK if trouble) * Can exist as standing water or marshland * Tends to be near large waterbodies (river/lake) * Also includes waterbodies (rivers, lake, etc)	* Obvious evidence of human activity * Near roads * Clustered * Tends to contain areas of non-forest and buildings (Greyish/Purplish in color)	
EXAMPLES									

Annex 17 Complementary Information on the Accuracy Assessment

This Annex presents the methodology used for the accuracy assessment.

Sampling Plan

Working steps for the accuracy assessment are described in detail below. Supplementary files (e.g. model used to design the reference sample set) are referenced where applicable. The steps below draw on accuracy assessment structure recommended in the GOFC-GOLD REDD Sourcebook 2014[100] and Olofsson et al. (2014).

Step 1: Sampling Design

As stated in the Mai Ndombe ERPD, Section 12, the sampling design will follow the FAO document "Map Accuracy Assessment and Area Estimation: A practical Guide" which is in turn based on Olofsson et al. (2014). The following definitions apply to the analysis:

- **Reference Classification Sampling Unit:** The original classification analysis was made based on manual / visual interpretation of 60m radius circular buffers centered on a grid of sample points overlaid on Landsat imagery. The assignment of land cover was based on the identification of majority of land cover within a 60m radius circular buffer placed around each sample within a grid of sample points. The sampling unit is therefore defined as this circular contextual area (11,310 m^2).
- **Reference Sampling Frame:**
    - **Geographical:** The sampling frame consists of the 37,184sampled points which were evaluated during the original classification.
    - **Temporal:** The accuracy assessment will assess LULC change within the time period from 2004 to 2014. All imagery used for the accuracy assessment (reference classification) will be identical to the imagery used for the original classification. This ensures that temporal change events are captured with minimal error and complexity.
- **Sampling estimator**: A double sampling estimator for stratification will be used.
- **Reference Sample Stratification[101]:** It is common practice to aggregate classes in the case of complex classification system (see Congalton and Green, 2008;Olofsson et al., 2014). Consequently, the accuracy assessment considers the following land cover / land use change categories:

N°	LULC Change class	Initial LC	Final LC
1	Primary deforestation (PDEF)	Primary forest	Non-forest[2]
2	Secondary deforestation (SDEF)	Secondary forest	Non-forest

[100] Section 2.7.3.1.3, GOFC-GOLD REDD Sourcebook 2014

[101] "Non-forest" aggregates all Non-forested classes included in the original REL model: Cropland; Grassland; Wetland/Water; Settlement; Bare Soil; and Burn Scar.

3	Degradation (DEG)	Primary forest	Secondary forest
4	Primary Regrowth (PREG)	Secondary forest	Dense forest
5	Secondary Regrowth (SREG)	Non-forest	Secondary forest
6	Stable Classes	Primary forest	Primary forest
		Secondary forest	Secondary forest
		Non-forest	Non-forest

Table 52. LULC classes ("change categories") used in the accuracy assessment

The original sample was spatially stratified according to a regional spatial stratification system, with each stratum receiving a different "sampling intensity" (spacing of systematic grid)(e.g. MIX, NFE, NFC, PFE, PFC and SEC), which are hereby referred to as "regional strata". Of the six regional strata, five were collected with identical sample spacing, so the probability of selection is the same for all plots in these strata, while the PFC stratum had a wider spacing, and therefore a different selection probability from the other five strata. For the purpose of this accuracy assessment, the five strata with the same sample spacing will be merged into one. The sample size per change category will be allocated within this merged stratum proportionally to the relative contribution of the change category to the total area[102].

- **Precision and confidence level:** This accuracy assessment shall produce estimates for deforestation, degradation and regrowth areas. These results shall be estimated at a10% relative margin of error at the 90% confidence level.
- **Sampling design:** The calculation of the reference sample size per change category shall be performed by the technical secretariat and shall follow the equations and guidance provided in Olofsson et al. (2014):

$$n = \frac{(\sum W_i S_i)^2}{\left[S(\hat{O})\right]^2 + (1/N)\sum W_i S_i^2} \approx \left(\frac{\sum W_i S_i}{S(\hat{O})}\right)^2$$

Where:

W_i Weight of change category*i*;

S_i Standard deviation of change categoryi;

[102] $W_h * P_{h,i}$ where:

- $W_h = \frac{Area_h}{Total\ Area}$ is the weight per stratum h(combined 5 regional strata andthe PFC stratum)
- $P_{h,i} = \frac{Count_{h,i}}{Total\ Count_h}$ is the relative proportion of class i per stratum h(combined 5 regional strata andthe PFC stratum)

$S(\hat{O})$ Standard error of the variable of interest;

N Number of plots in the region of interest (i.e., population size);

A minimum number of 100 sample points per change category (across all regional strata) shall be set. If the total number of sample points per change category is less than 100, then additional points for this class are added to each regional stratum until the sample size is equal to or greater than 100. Points are allocated to the two groups of regional strata based on their relative contribution to the total area of the change category.

Table 2 below shows the calculation of the number of reference samples by both regional stratum and change category and shall be used for this accuracy assessment without exception:

	ALL	PFC	TOTAL
DEG	169	108	**277**
STABLE	660	183	**843**
SREG	71	30	**101**
PREG	90	46	**136**
PDEF	71	30	**101**
SDEF	92	9	**101**

Table 53: Calculated number of reference samples per change category and regional strata

Step 2: Response design

The response design for this accuracy assessment follows the GOFC-GOLD 2012 guidance. It is comprised of the protocols used to analyze the reference classification dataset and the definition of agreement for comparing original classification labels to reference classification labels.

Reference Classification Data:

Congalton & Green (2009) and Olofsson et al.(2014) recommend that reference classification data is of higher quality than map (original classification) data. The source of the reference classification data (imagery) shall adhere to the following criteria:

- For all dates (2004, 2006, 2008, 2010, 2012 and 2014), the imagery used for the reference classification shall be the exact same imagery (satellite, sensor, acquisition date) as was used for the original classification. The ER Program technical secretariat shall provide all original classification imagery (in the form of mosaics and individual tiles) to the accuracy assessment firm to eliminate large pre-processing times and arduous download times required to acquire such a large image repository in the DRC.
- For all dates (2004, 2006, 2008, 2010, 2012 and 2014) any other suitable imagery, particularly very high resolution imagery, which helps to conduct the classification may be used. Such supplementary imagery is suggested, but not required for reference classification, except for the following sub-situation:
    - For all sample points identified as degradation (DEG) in the original classification, the use of very high resolution imagery for the reference classification is

compulsory. This is to provide a validation of the original degradation interpretation procedure.

- The imagery used for the reference classification must be perfectly geo-registered with the original classification imagery. Any geo-registration error introduced due to the use of different imagery than the original has the potential to introduce significant random error into this accuracy assessment. This rule must therefore be adhered to rigorously.

The higher quality of the reference classification is assured by the independent classification of each point by three interpreters, and by revising the classification where no consensus exists.

Labeling:

LULC Classes

Analysts shall assign a reference class label choosing from the same LULC classes that were used for the original classification, keeping in mind that all non-forest classes are aggregated into a single class (see Table below).

Table 3: Aggregation of LULC classes for the accuracy assessment

Detailed LULCOriginal Classification Labels	Simplified LULCReference Classification Labels
Primary forest	Primary forest
Secondary forest	Secondary Forest
Cropland	Non-forest
Grassland	
Settlement	
Bare soil	
Burn-Scar	
Wetland/water	
Cloud / shadow	Cloud / shadow
SLC-off / other image error	SLC-off / other image error
No image	No image

LULCClassification procedure:

The original classification model employed a manual/visual classification of sample points, and this classification is performed by human beings who were trained to identify contextual clues (i.e. color, texture, proximity to known landmarks, etc.). The training manual which provides a detailed procedure for the identification of each LULC class is included as an annex to this document (Annex A). To prevent the introduction of errors based on variation in interpretation procedure, the analysts carrying out this accuracy assessment shall strictly adhere to the classification method described in the training manual.

The analysts shall undergo a training session during which they are given the opportunity to practice classifying sample points using the procedures described in the aforementioned manual. It is also recommended that the analysts are required to demonstrate their proficiency by passing a standard test, in which a trained authority can evaluate each analysts' classification style and ability to correctly

classify the land cover classes described in table 3 above. The standard test used for the original calculation of the REL will be provided to the team leader by the technical secretariat.

To prevent the introduction of systematic error into the accuracy assessment, the reference classification will use the same definitions for labeling/assigning of LULC classes as the original classification, but will observe the change in the defined period, which gives additional contextual information, in order to assign the corresponding LULC transitions(change classes).

Interpretation Procedure for all change categories:

We assume relatively high confidence for the identification of primary forest and non-forest land cover classes. We can therefore assume that deforestation samples (PDEF, SDEF) and stable samples (i.e. unchanging) produce relatively accurate representations of LULC change. Those samples that were labeled as regeneration (PREG, SREG) offer conservative contributions to the REL, so they are also included in this interpretation procedure category. As such, the use of VHR imagery is encouraged for this interpretation category, but not required.

The following describes qualifications for the analyst team:

Team composition and qualifications:

- 1 Team leader with a master's degree or PhD in remote sensing and at least 5 years of work experience in LULC change mapping and production of corresponding accuracy assessments. Experience with remote sensing in Central Africa (Congo Basin) is desired.
- 3 Remote sensing analysts with considerable local knowledge of the flora in the Program area and at least 3 years of work experience in LULC change mapping. Work in Central Africa (Congo Basin) is desired.

The procedure for classifying the reference classification sample points is described by the following steps. QA/QC is also described herein:

- Reference sample points shall be randomly distributed by the accuracy assessment firm within regional strata according to table 2 above.
- Each analyst will assign a land cover label (according to table 1 above) for each of the assigned sample points for all dates (2004, 2006, 2008, 2010, 2012 and 2014), using the exact same images as were used for the original classification.
- Supplemental VHR imagery may be used for all dates (2004, 2006, 2008, 2010, 2012 and 2014), but *must be used* for those samples originally classified as degradation (DEG).
- Points for which only 1 image is available should still be labeled but will not be used for further analysis.
- For supplementary VHR image selection, quality shall take precedence over quantity. This means that the analyst should prioritize imagery which provides a clear view of the sampling unit (60m radius around the sample point). If for example there are 4 images for a given sample point but in 2 images the sampling unit is partly obscured by cloud or shadow or SLC-off, then only the remaining 2 images shall be used.
- For each date (2004, 2006, 2008, 2010, 2012 and 2014), the analyst shall assign a LULC class based on the majority of the identified LULC, i.e. >50% of the area of the sampling unit (within the 60m circular buffer). See the training manual included in Annex A for more detail.
- To ensure that the new classification is considered as reference data, each reference classification sample shall be analyzed separately by 3 different analysts (i.e. 3x per sample).

This exercise will also help for QA purposes to the team leader to understand the correct implementation of the operating procedures and shall be implemented as soon as data from three interpreters are available. The team leader shall compare the labels for each sample and use the following procedure to accept or re-evaluate the sample:

Analyst agreement category	**Team leader action**
All analysts disagree (produce 3 different labels)	Team leader re-evaluates the sample and makes his/her own decision to assign a label to the sample.
2 Analysts produce the same label and one analyst disagrees	Team leader retains the majority label identified by the 2 analysts
All analysts agree (produce 3 identical labels)	Team leader retains the agreed-upon label

Additional interpretation Criteria for degradation samples:

Just as we assume relatively high confidence for the identification of primary forest and non-forest land cover classes, we cannot make the same assumption for those points originally labeled as degradation. This is because secondary forest is commonly much more difficult to identify. It has therefore been determined as highly important to validate the original procedure for identifying *forest degradation*. As such, the analysts shall adhere to the following special interpretation criteria:

- In general, the original classification shall not be known to the analyst, in order to prevent bias.
- Sample points that were labeled as *degradation* by the original classification analysts will be flagged for special treatment. The analysts should not be informed that these points were labeled as degradation but will only be told the points have been selected for special treatment. For these points, HR or VHR imagery is compulsory. Additionally, for those points labeled as degradation in the original classification, the team leader shall re-evaluate each reference sample point and use the following procedure:
    - The team leader shall determine the change category for these samples directly (i.e. label the sample points as (PDEF, SFEF, DEG, PREG, SREG or STABLE) by observing all points in time (2004, 2006, 2008, 2010, 2012 and 2014) as well as the compulsory VHR imagery for as many dates as possible. At the very minimum, VHR imagery must be utilized for evaluation of the dates where the original classification indicated a degradation transition. For example, if during the original classification, the analyst indicated a degradation transition (PF->SF) between 2006 and 2008, VHR imagery shall be collected for 2006 and 2008 and used to observe those same dates for the reference classification.
    - For these samples, the team leader shall use additional time to carefully analyze the imagery for change using all methods available and applicable to the sensor.

Determining LULC transitions (change classes)
Based on the final land cover classifications for each sample point for all 6 epochs, a land cover change profile will be defined. This land cover profile will be allocated to one of the change categories using the same classification (amelioration) rules as the original classification. The technical secretariat will provide a prepared excel spreadsheet which will automatically determine the land cover change profiles. More details on the amelioration process is provided in the ER-PD.

For those points classified originally as degradation, the labelling of the change category will be complemented with the interpretation described in the previous section. The team leader will use the additional criteria required for assessing degradation points for the following cases:

- Original classification samples labeled as degradation
- Reference classification samples labeled as degradation

This will serve to validate the degradation model.

<u>Step 3: Analysis Design</u>

The following analysis will be conducted following Olofsson et al. (2014):

- A simple confusion matrix with error counts;

- Error matrix of proportions of area. Since the reference data is allocated in two regional strata, this error matrix must be constructed considering the weights of each change category and each regional stratum;
- User's accuracy (complement of commission error rate of the original classification) and confidence interval;
- Producer's accuracy (complement of omission error rate of the original classification) and confidence interval;
- Overall accuracy and confidence interval;

To estimate the so called "adjusted areas" or area estimates based on the reference classification and its associated confidence interval, a double sampling estimator for stratification, as described in Cochran (1977), will be used. The adjusted areas will be estimated by multiplying the estimated proportion of area of the change category ($\hat{p}$) by the total area of the region and the confidence intervals will be estimated with the variance of the estimate ($\hat{v}(\hat{p})$):

$$\hat{p} = \sum_h w_h p_h$$

$$\hat{v}(\hat{p}) = \sum_h \left(\frac{1}{n'\gamma_h} - \frac{1}{N}\right) w_h n_h p_h (1 - p_h)/(n_h - 1) + \frac{g'}{n'} \sum_h w_h (p_h - \hat{p})^2$$

Where:

n'	sample size of the first-phase sample, which is the original sample
n'_h	number of sample points of the first-phase sample in stratum h, where the strataare the change class categories of the original classification within each of the two regional strata
n_h	Sample size per stratum of the second phase sample. The second phase is the reference sample.
$\gamma_h = n_h/n'_h$	specified prior to selecting the second phase sample
$w_h = n'_h/n'$	Estimated weight for stratum h
p_h	sample proportion of points of the class (change category of reference classification) in stratum h (change category of original classification)
N	total number of potential sampling units in the region of interest
g'	$g' = (N - n')/(N - 1)$

Annex 18 Wildlife Works Sampling Approach Analyst Training Manual

Analyst Training Manual

Version 1.9 - mise à jour le 06.02.2015

Wildlife Works / ERA Congo

Manuel de formation sur la collecte des données du niveau de référence du Programme de réduction à Mai Ndombe

Introduction

Bienvenue à l'équipe du programme de réduction de Mai-Ndombe chargée de la collecte de données! Nous vous félicitations pour votre emploi chez ERA Congo/ WWC. Vous avez été choisis pour aider à une tâche extrêmement importante. Ce qui suit est une brève description de ce que vous allez faire, et surtout pourquoi vous le ferez. Encore une fois, vous êtes les bienvenus à l'équipe, et que vos efforts soient couronnés de succès!

Le Programme de réduction à Mai Ndombe

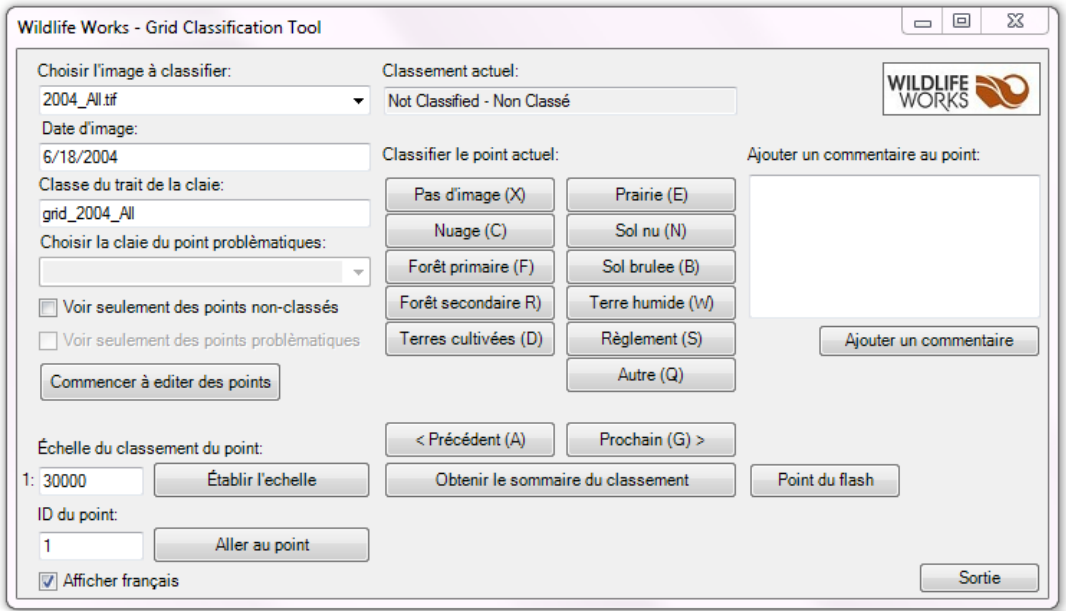
Le Programme de réduction des émissions à Mai Ndombe (ER-Program) est un effort au niveau international pour protéger une grande partie du domaine forestier du Bassin du Congo, tout en fournissant simultanément l'emploi et les moyens de subsistance alternatifs vitaux pour les communautés locales qui vivent dans et autour de ces mêmes forêts. Ce programme fourni un exemple, à grande échelle, de «la déforestation évitée», un nouveau paradigme internationale dont le but est de fournir des financements pour la protection des forêts et de la biodiversité à travers un finance bilatéral et multilatéral. Ce nouveau concept vise à construire, à partir des efforts d'aides précédents de la communauté internationale, en mettant l'accent plus sur l'importance de la protection des forêts, plutôt que leurs destruction, ce dernier étant malheureusement, jusqu'à nos jours, un cas commun à beaucoup de pays en développement. Le Programme de réduction à Mai Ndombe est l'un des premiers et le plus important en son genre, et ouvrira la voie aux autres pays qui voudront réaliser des réductions des émissions à grande échelle, tout en soutenant leurs communautés forestières rurales et de ce fait, permettant l'atténuement du réchauffement et du changement climatique. Etant donné qu'il y a plusieurs pays qui sont, au niveau international, en train de participer à la fois à la protection et au financement de ces efforts, l'espoir est que ce programmes de rémunération au rendement (payé-par-performance) constitueront un modèle normal pour assurer un écoulement budgétaire important entre Nord et Sud.

Comment mesurer le niveau de référence des émissions (REL)

Tout système de rémunération au rendement (payé-par-performance) requiert à ce qu'on établisse un niveau de référence d'émissions (REL), aussi appelée "ligne de base" sur laquelle la performance est mesurée. Si les émissions globales dépassent la ligne de base, le programme est jugé défaillant et ne bénéficie d'aucun financement. Toutefois, si les émissions sont en fait en dessous de la ligne de base, les crédits dégagés sont réparti aux promoteurs du programme. Ces crédits peuvent ensuite être vendus sur le marché international de réduction, à travers des accords bilatéraux et multilatéraux avec d'autres pays, pour financer le programme lui-même et les communautés vivant dans et autour de la forêt. Votre travail consiste à nous aider à mesurer ce REL (ligne de base). Nous allons calculer le niveau de la déforestation qui a eu lieu dans la province Mai Ndombe au cours des 10-15 dernières années. Ce taux sera utilisé comme base de référence pour la zone du programme qui est soumis à la déforestation non planifiée (en dehors des zones de concessions d'exploitation légale). Votre travail est donc essentiel à la réussite de ce Programme de réduction à Mai Ndombe. Nous vous remercions pour vos efforts, et nous espérons que vous apprécierez ce travail si important!

Identification de la couverture terrestre

Pour mesurer le niveau de référence (REL), nous devons comprendre comment la couverture terrestre change au fil du temps. Nous allons employer les différentes classes de la couverture terrestre identifiées par le panel international sur l'évolution du climat (GIEC) se trouvant dans leurs lignes directrices pour une bonne pratique. Ces classes de couverture du sol sont:



Wildlife Works Outil de Collecte de Données. C'estun « Add-in » ArcGIS.

Primary forest - Forêt primaire

Secondary Forest - Forêt secondaire

Cropland - Terres Cultivées

Grassland - Prairies

Wetlands - Terre Humide

Settlement – Peuplement

Nous avons également inclus les sous-classes suivantes représentant des caractéristiques communes à la couverture de terre:

Cloud / shadow – Nuage / Ombre

BurnScar – Sol Brulée

BareSoil – Sol Nu

Other – Autre

No Image – Pas d'Image

Vous aurez à utiliser l'outil d'identification Wildlife Works pour effectuer la classification un groupe de points qui sont superposés sur des images recueillies pendant la période de la référence historique (10-15 ans avant nos jours). Avec cet outil, vous serez en mesure de naviguer entre les points, de faire le zoom avant et arrière (choisir échelle de l'image), de flasher le point central (pour distinguer le point que vous identifiez de tous les autres) et quelques autres tâches importantes pour votre travail. Pour obtenir des instructions détaillées sur la façon d'utiliser l'outil de collecte de données, s'il vous plaît se référer aux documents protocolaires de WWC pour la classification.

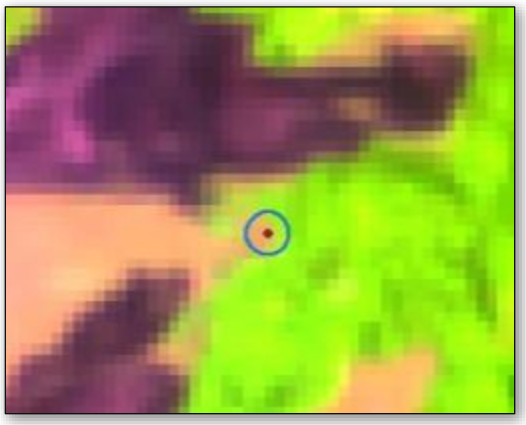
Classification des échantillons se référant au contexte environnant

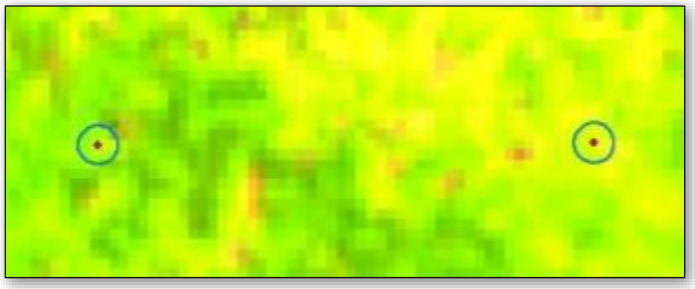
Vous sélectionnez manuellement une classe pour chaque point d'échantillon en utilisant l'outil ci-dessus. Cependant, vous devez prendre soin de vous assurer de choisir la classe de la couverture terrestre pour chaque point échantillon sur la base des deux pixels voisins tournant radialement dans chaque direction menant vers l'extérieur à partir du pixel sur lequel l'échantillon directement tombe. Pour les images Landsat, ce qui correspond à un tampon-cadre de 60m qui devrait être utilisé pour classer chaque échantillon (par exemple, l'échantillon doit être classé selon sa région radiale immédiate de 2 pixels, non pas le pixel isolé sur lequel l'échantillon tombe). L'expérience nous a enseigné que ce contexte radial de 60 m doit être pris en compte dans la décision de classement. Si vous observez le seul pixeldans l'échantillon, et ignorer tous les pixels voisins, il y a beaucoup de chances que la précision de la classification soit erronée, car un seul pixel ne contient pas suffisamment d'informations pour identifier définitivement une seule classe de la couverture terrestre. En cas des problèmes ou questions sur l'utilisation du contexte environnant pour classer les points d'échantillon s'il vous plaît demander à Yuni, Jeremy, Eric, Jean-Paul ou Prof. Bwangoy.

Exemples d'identification de l'échantillon utilisant le tampon-cadre de 60 m

Identifier la forêt primaire

Une forêt primaire décrit l'état qu'aurait eu la forêt du Congo en cas d'absence d'une quelconque influence humaine. Souvent on assimile affectueusement la forêt primaire du bassin du Congo à la «forêt de brocolis », car elle ressemble aux légumes qu'on appelle 'brocoli' vue d'en-haut. Actuellement, la majeure partie de bassin du Congo a connu une influence humaine tellement importante qu'il ne reste

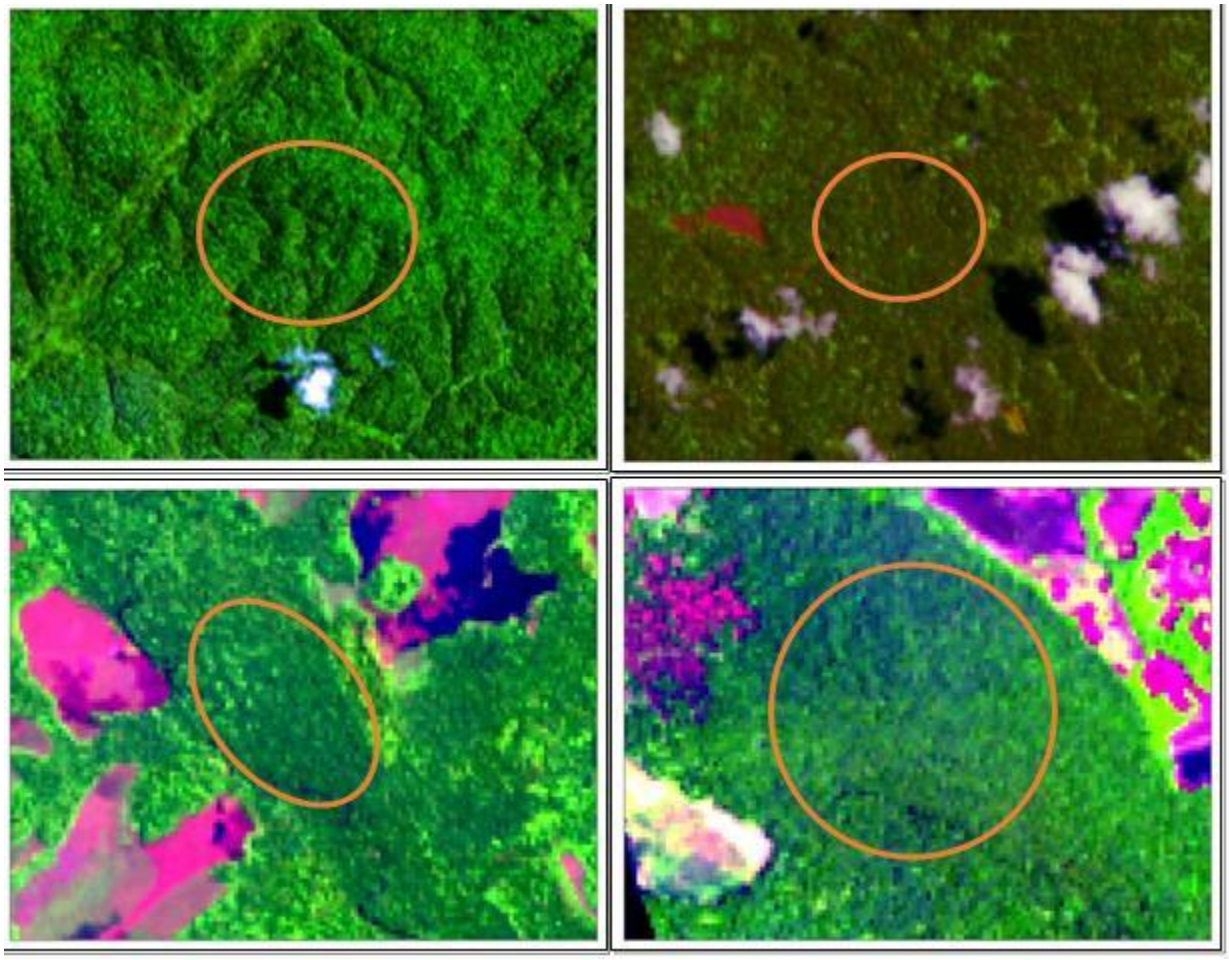




pas grand-chose de forêt primaire à Mai Ndombe. Une grande partie de cette forêt est maintenant, ou a été, une fois, dégradée, mais il ya encore quelques éclats visible de forêt primaire dans certaines zones. S'il vous plaît voir les exemples ci-dessous.

L'identification d'une forêt primaire dans l'imagerie de résolution moyenne tels que Landsat est relativement simple. Comme vous pouvez le voir dans l'exemple ci-dessous, il a tendance à paraitre vert foncé, en utilisant soit la combinaison des bandes de vraies couleurs ou des fausses couleurs (pour plus d'informations sur les combinaisons de bande et l'identification de la couverture terrestre, s'il vous plaît voir l'annexe A). La principale caractéristique qui distingue la forêt primaire des autres types de forêts est sa texture. Il a tendance à paraitre "brute" càd, frappant à l'œil comparativement à la végétation basse comme les prairies et les zones arbustives. Généralement, elle se différencie de la forêt secondaire par sa

cohérence. La forêt primaire est plus cohérente (en raison de la canopée élevée) que la forêt secondaire, laquelle, selon le niveau de dégradation, peut me paraître plus inégale ou sporadique.



Exemples de forêt primaire

Identifier Forêt secondaire

Laforêt secondaire est la plus commune soit peut-être la classe de la couverture terrestre la plus difficile à isoler dans un régime de forêt dense humide comme le Bassin du Congo. Elle est définie selon le caractère élevé du niveau de dégradation (dans ce programme, la forêt secondaire est définie comme toute forêt ayant une couverture de canopée de plus de 30% et quelque part en dessous de 75-80%). Pour le déterminer c'est en observant plusieurs attributs de l'imagerie qui tendent à identifier et à délimiter les forêts secondaires par rapport aux autres forêts et végétation. Les caractéristiques suivantes sont communes à la forêt secondaire, et peuvent être utilisées comme lignes directrices d'identification:

Tendance à apparaître plus «légère» en couleur que la forêt primaire (c'est à dire des tâches vertes pâle entourées de vertes foncées)

Après l'égalisation d'histogramme (voir l'annexe A), apparait à quelques endroits une forêt secondaire fortement dégradée, laquelle allant d'un vert très pâle à la couleur jaune.

La texture peut paraitre plus irrégulière ou inégale, en particulier pour la forêt secondaire lourdement dégradée**.**

Exemples de forêt secondaire

Image haute résolution (Bing Maps) dans « Truecolor » « FalseColor » (à gauche) et « FalseColor » avec égalisation d'histogramme (à droite)

Cultures (agriculture, cultures Mosaïque)

Une grande partie de la surface cultivée dans la région de Mai Ndombe est détenue par de petits fermiers et des agriculteurs qui pratiquent l'agriculture non mécanisée. Parlant des terres cultivées on remarque le traçage des lignes droites (par exemple, en forme carrés ou rectangles) qui délimitent les champs de cultures et les terrains en jachère. Les surfaces cultivées ont tendance à exister de cultures plantées en forme d'une mosaïque de cultures ou des terrains en jachères/abandonnés, présentant, d'une manière inégale, des endroits en couleur vert vif (végétation) et violet/rouge (les jachères/sols nus). Des modèles distincts (représentant des rangées de cultures plantées) sont associés à des terres cultivées, ce qui le rend relativement facile à repérer. La terres cultivée a aussi tendance à se constituer en groupes, et sont rarement placées dans l'isolement.

Exemples Cultures / cultures Mosaïques

Image haute résolution (Bing Maps) dans « Truecolor »

« FalseColor » avec égalisation d'histogramme (à gauche) et « TrueColor » (à droite)

Prairies / Savane

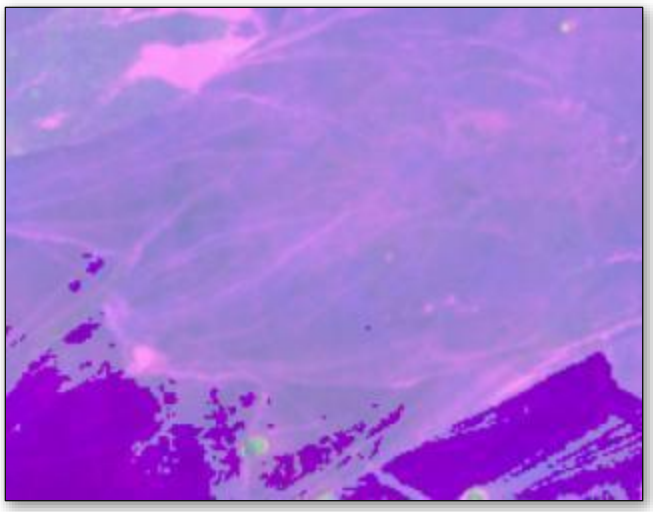
Bien que l'on puisse retrouver des prairies/savanes dans la région de Mai Ndombe, cependant il existe aujourd'hui très peu des savanes "naturelles" dans la forêt du Congo. La plupart des prairies identifiées actuellement ont été des forêts autrefois mais qui ont été déboisées à un moment. Cela dit, les zones de prairies sont principalement identifiées par leur texture lisse (par opposition à la texture plus rugueuse associée à la forêt). On situerait la prairie quelque part entre la couleur grise et gris-verte. Il ya vraiment pas des très grandes zones de prairies/savanes dans le Mai Ndombe, par conséquent, on les observe souvent sous forme de petites parcelles disséminées dans le paysage.

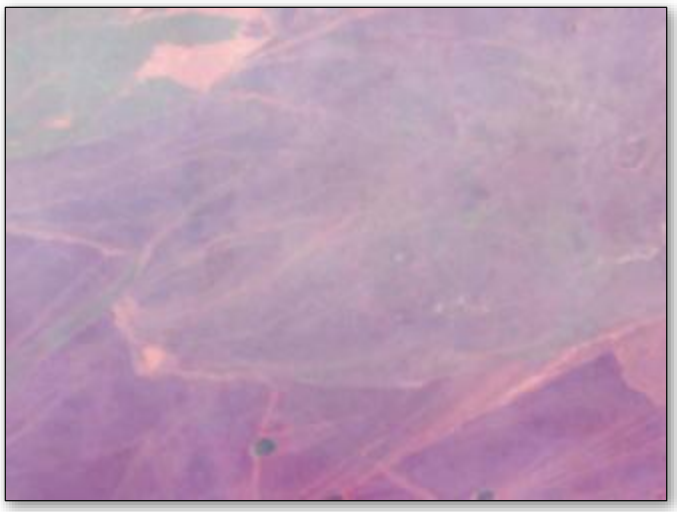
Exemples Prairies / Savane

Image haute résolution (Bing Maps) dans « Truecolor »

« FalseColor » avec égalisation d'histogramme (à gauche) et « TrueColor » (à droite)

Les Zones Humides





Nous définirons les zones humides, dans le cadre de ce projet, toute zone inondée soit d'une manière permanente ou saisonnière, par des pluies, ainsi que tout endroit jugé également non-forêt. Cela comprend les zones de marais et de prairies inondées. Cependant, il n'inclut pas les zones forestières qui sont inondées, qui, dans le cadre de ce projet devraient être classées comme forêt primaire ou secondaire. Les zones humides et de prairies partagent souvent les mêmes attributs, car ils représentent toutes les deux les caractéristiques non-forêts et se caractérisent par leur texture lisse et de couleur grisâtre verte (vert mat).

Exemples Zones Humides

Image haute résolution (Bing Maps) dans « Truecolor »

« FalseColor » avec égalisation d'histogramme (à gauche) et « TrueColor » (à droite)

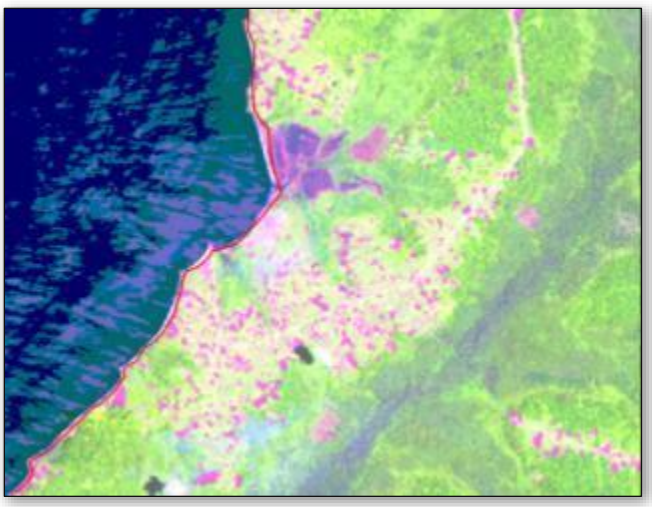
Structure de Peuplement

Une structure de peuplement est définie comme étant les lieux où vivent des personnes. Ca peut être des petits villages, villes ou une ville aussi grande que Kinshasa. Il doit y avoir des preuves qu'il y a un groupement des domiciles des personnes, c.-à-d mosaïque urbaine (maisons, des cabanes, des routes disposées dans une grille, etc.). Un domaine agricole isolé ou une structure isolée éloignée de toute autre activité humaine ne devrait pas être définis comme une structure de peuplement. Un peuplement apparaît souvent comme une mosaïque de petits domaines agricoles, des structures d'habitation, routes et autres espaces utilisés par les villageois à des fins diverses. Les zones de peuplement sont entièrement créées et maintenus par l'activité humaine.

Exemples Structure de peuplement

Image haute résolution (Bing Maps) dans « Truecolor »

« FalseColor » avec égalisation d'histogramme (à gauche) et « TrueColor » (à droite)



Nuage / Ombre

Les nuages/ou l'ombre repérées sur le terrain sont fréquents dans les écosystèmes tropicaux humides tels que le bassin du Congo. Vous rencontrerez probablement de nombreux cas de zones nuageuses et d'ombre. L'algorithme de modèle suppose que les nuages et les ombres sont correctement classés comme «nuage/ombre». Il est extrêmement important de savoir qu'il ne faut pas essayer de deviner la couverture terrestre à travers un nuage ou une ombre. Au cas où le prélèvement d'un échantillon tomberait sur un nuage ou une ombre, et que le sol n'est pas visible à travers ce nuage/ombre, pour ce cas choisissez simplement l'option «nuage/ombre» et ensuite passer à l'échantillon suivant. Habituellement l'aspect du nuage est soit blanc lumineux soit blanc bleuâtre, tandis que l'ombre d'un nuage est généralement de gris foncé à noir. Chaque nuage doit avoir une ombre... ainsi, les ombres pourront être facilement identifiées (ces ombres devraient être près de, et ayant la même forme de leur nuage respectif).

Exemples Nuage / Ombre

« TrueColor » (à gauche) et « FalseColor » avec égalisation d'histogramme (à droite)

Cicatrice de Brûlure

Les cicatrices de brûlures sont très fréquentes dans le bassin du Congo, aux endroits où l'on pratique la petite agriculture tout en utilisant les techniques de l'agriculture sur brûlis. Les agriculteurs brûlent régulièrement les arbres afin de dégager les domaines de l'agriculture, laissant derrière des cicatrices qui sont très faciles à identifier dans les images de télédétection. Dans une image de fausse couleur (FalseColor), les cicatrices de brûlure apparaissent comme violet très foncé ou noir, et on les retrouve souvent au milieu d'une portion de terre nue. On peut distinguer les cicatrices de brûlures assez facilement du sol nu par leur obscurité relative... les cicatrices de brûlure sont beaucoup plus sombre que tout autre élément de la couverture terrestre, sauf peut-être l'ombre d'un nuage**.**

Exemples Cicatrice de Brûlure

« Truecolor »

« FalseColor » (à gauche) et « FalseColor avec égalisation d'histogramme » (à droite)

Sol Nu

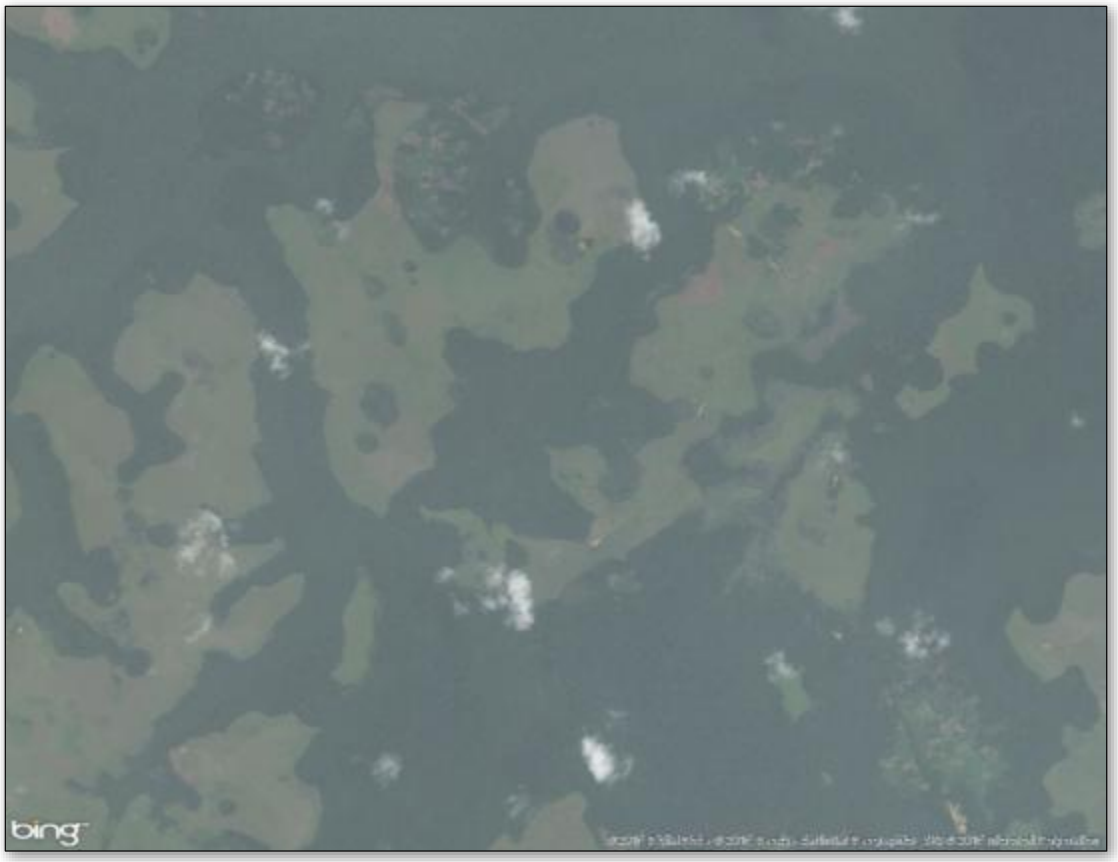
Le sol nu, il se peut que ça soit la caractéristique de la couverture terrestre la plus simple à identifier dans un écosystème tropical humide. Elle peut être presque universellement identifiée par sa couleur distinctive lorsqu'elle est affichée dans une combinaison de bande de fausses couleurs (voir l'annexe A ci-dessous). Dans fausse couleur (FalseColor), le sol nu est de couleur vive rougeâtre (parfois violet rougeâtre

si la brulure est récente). Les portions de terre nue sont presque toujours d'origine humaine (il existe très peu de cas des terrains naturellement nudans le bassin du Congo).

Exemples de Sol Nu

Image haute résolution (Bing Maps) dans « Truecolor »

« FalseColor » avec égalisation d'histogramme (à gauche) et « TrueColor » (à droite)



Autre

La catégorie «autre» est réservée pour les zones qui ne correspondent à aucune des catégories décrites précédemment. Les exemples communs incluent:

Scan-Off line (SLC-off) rayures dans les images Landsat (voir à gauche ci-dessous)

Les zones hors de l'image (fond voir à droit ci-dessous)

Les erreurs de données

Remarque: La classe «autre» n'est utilisée que pour les trois exemples donnés ci-dessus. Ne pas utiliser la catégorie «autre» si vous doutez d'une couverture terrestre données. Solliciter plutôt une aide. Toutes les zones qui sont visibles sur une image seront intégrées dans une des classes de couverture terrestre décrite précédemment dans le présent document.

«Autres» Exemples

Les zones en-dehors de l'image (gauche) et les rayures SLC-off (droit)

Amélioration de l'image et afficher des images en utilisant différentes combinaisons de bande

L'imagerie satellitaire peut être consultée de différentes façons afin de créer des images en couleur spécifiquement adaptées pour identifier les caractéristiques d'intérêt. Une méthode est qu'il faut arranger les «bandes» des images dans différentes combinaisons. Certaines combinaisons rendent plus facile à distinguer la végétation par rapport aux autres caractéristiques tandis que d'autres permettent l'identification de l'humidité ou même du sol nu. Une fois que les bandes sont disposées pour former une image en couleur, alors on emploiera 'amélioration de l'image' pour améliorer d'avantages les caractéristiques d'intérêt.

« Truecolor » (3,2,1)

Vraie couleur "Truecolor" est une façon de voir les images comme l'œil humain les verrait. En d'autres termes, TrueColor affiche des images dans son état naturel. Truecolor peut être utile pour comparer par rapport à d'autres combinaisons de bandes (comme FalseColor), mais en aucun cas il accentue les types de végétation. Les couleurs sont souvent en sourdine et peuvent se fondre ensemble, par conséquent, on ferait bien attention lors de la visualisation d'images dans une combinaison de bande de truecolor. Il est souvent avantageux de basculer entre les vraies couleurs et les fausses couleurs 'FalseColor' lorsque l'on tente d'identifier des caractéristiques particulières ou des classes de couverture du sol (par exemple de la forêt marécageuse). Voici la même image que celle présentée ci-dessus, mais dans Truecolor. Notez les différences qu'il ya dans les différentes correctifs de la couverture de terres ainsi quela comparaison de ces correctifs à la fois en vraies couleurs et en fausse couleur 'FalseColor'.

Vraie couleur « Truecolor » {3,2,1} détails

Dans l'image Truecolor ci-dessous, noter la couleur relativement uniforme de la forêt. Il ya de légères différences en vert qui peuvent être remarquée, mais en général, il est difficile de distinguer la forêt primaire de la forêt secondaire. Les plaques de sol nu vu dans le coin inférieur droit de l'image sont perceptibles, et apparaissent brun-vert, comme ils le feraient à l'œil nu. En raison du fait que les différents types de végétation photosynthétique tendent à se fondre ensemble dans une image TrueColor, fausse couleur 'FalseColor' est préférable lors de la classification des phénomènes tels que la dégradation et la déforestation des forêts. Dans un écosystème tropical humide comme le Bassin du Congo, les zones de déforestation peuvent être identifiées en raison de leur contraste avec la végétation environnante.

Image « Truecolor » (3,2,1)

« Falsecolor » (5,4,3)

Plusieurs analystes de télédétection préfèrent voir les images dans "FalseColor" lors de l'identification de différents types de végétation. L'identification des forêts est particulièrement bien adaptée dans le FalseColor. FalseColor désigne une combinaison particulière de bande qui accentue l'activité photosynthétique (plantes) et permet de distinguer la couverture des terres avec végétation de celle qui n'a pas une végétation. Comme expliqué ci-dessous, le type de FalseColor vous allez utiliser est celui qui affiche la végétation dans les tons de vert, alors que le sol nu apparaît en rouge ou violet foncé, ou même noir, en fonction de la couleur de la terre elle-même. Les zones urbaines sont également facilement identifiés par leur teinte pourpre-gris et leur contraste avec la végétation qui les entoure.

« Falsecolor » {5,4,3} détails

Voici quelques exemples de zones de végétation mixte et des plaques de sol nu, ainsi que quelques plaques à divers stades de la transition. Notez les zones verdâtres qui représentent une végétation saine et aussi les zones violet rougeâtre qui représentent le sol nu. Les domaines de forêt en transition peuvent apparaître parfois comme violet/rouge (sol nu) vert grisâtre (prairies), jaune (forêts fortement dégradées lorsqu'on les examine sous l'égalisation d'histogramme), vert clair (forêt légèrement dégradée) ou vert foncé (forêt primaire).

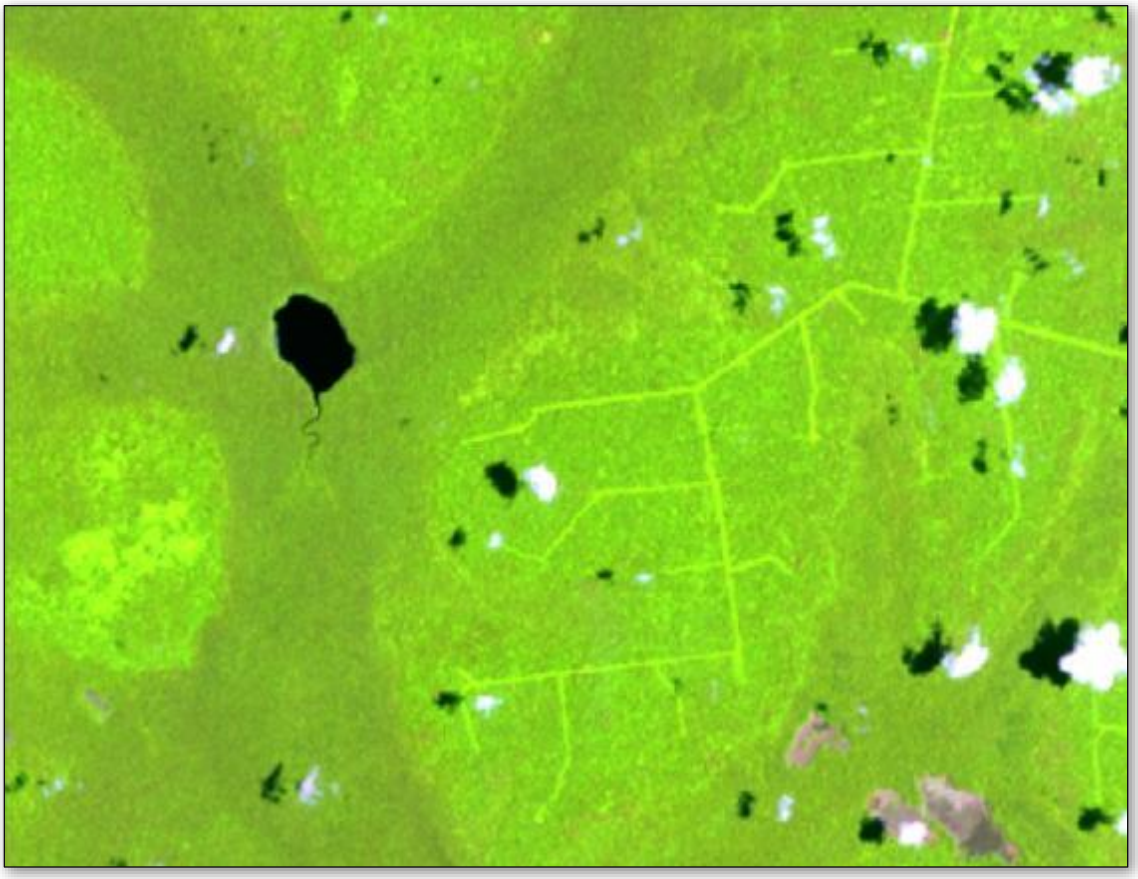


Image « FalseColor » (5,4,3)

Égalisation d'Histogramme

L'égalisation d'histogramme est une technique d'amélioration d'image qui fonctionne bien pour identifier les caractéristiques de la couverture terrestre dans la forêt du Bassin du Congo. Par exemple, il est beaucoup plus facile de discerner l'humidité sur une image provenant d'un histogramme pondérée (égalisée) que d'ailleurs. De même, la dégradation des forêts est accentuée dans une image pondérée de l'histogramme. Au moment où dans une image TrueColor (voir ci-dessous), la forêt secondaire/dégradée peut seulement paraitre un peu moins vert que la forêt primaire (le cas échéant), une fois que l'image est pondérée dans l'histogramme, la dégradation apparaît dans des couleurs jaunes lumineux (et parfois autres). Il convient de noter que l'égalisation d'histogramme est simplement une façon différente d'améliorer l'apparence de l'imagerie. Il ne change pas la valeur de données sous-jacente des pixels individuels.

Comment Histogramme égalisation dans ArcMap

Dans ArcGIS, égalisation d'histogramme peut être effectuée en utilisant la fenêtre d'analyse d'images (voir ci-dessous). Votre image d'intérêt peut être choisie dans la liste des images. Ensuite, dans la section Affichage, sélectionnez " histogramme Egaliser “. Vous devriez voir votre image change visiblement. Voila! Votre image est maintenant renforcée…

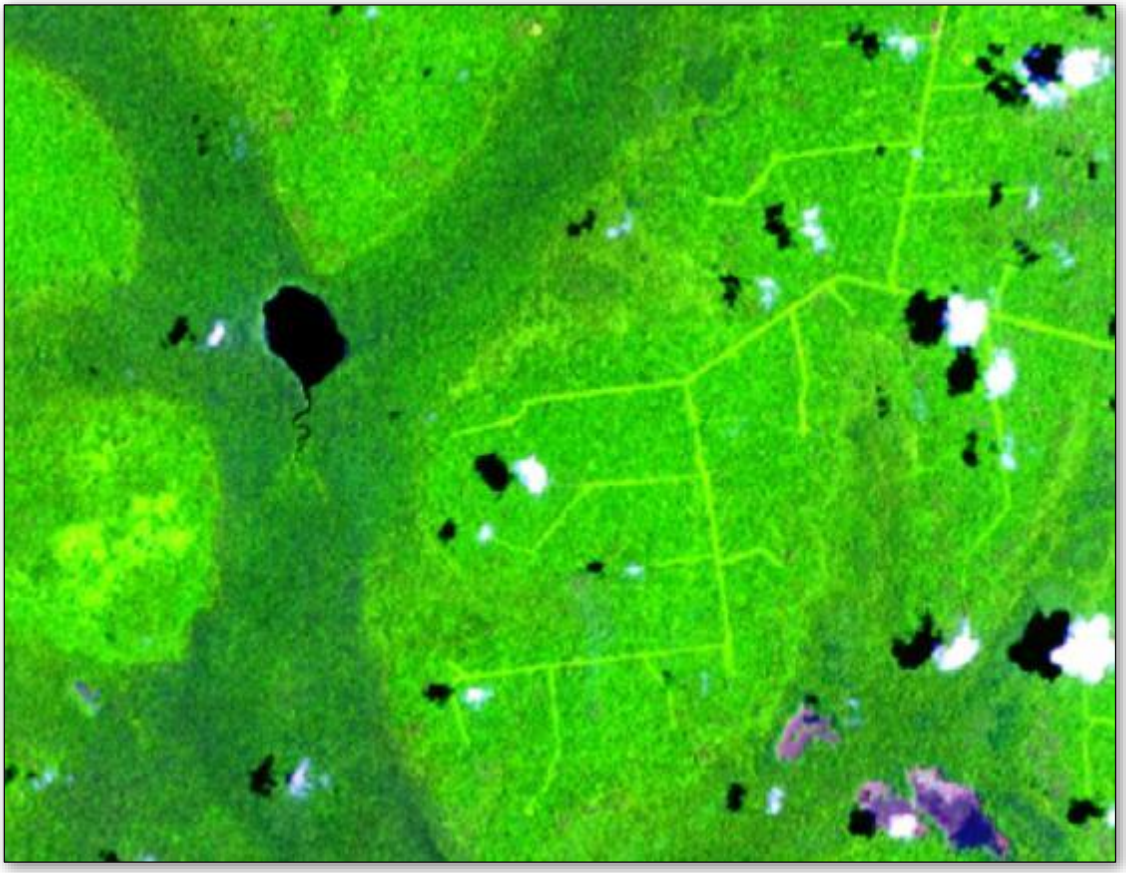
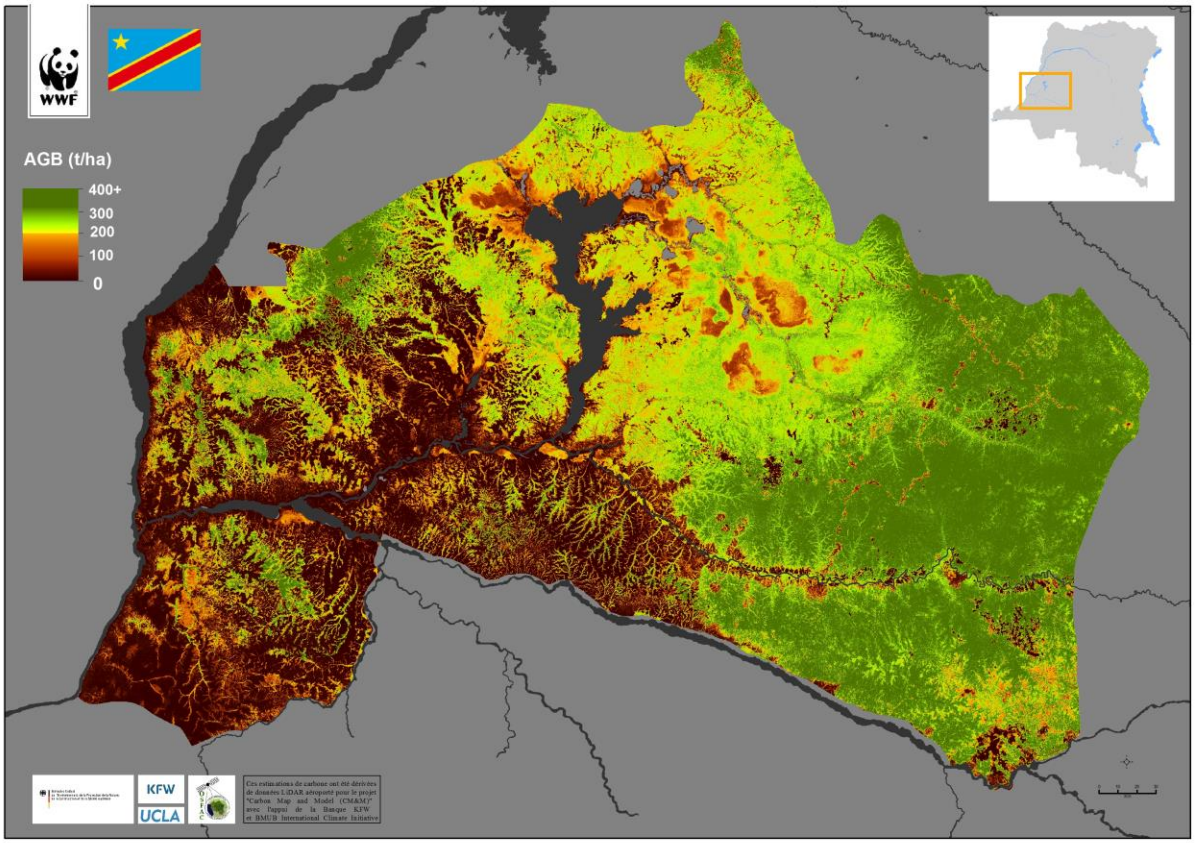


Image égalisationd'histogramme (« FalseColor »)

Annex 19 Above Ground Biomass Map for Mai-Ndombe Province driven with aerial LiDAR data[103]



[103]WWF project Carbon Map and Model funded by BMUB/IKI. Source : UCLA/WWF, 2016.