MAI NDOMBE REDD+

A JOINT PROJECT OF ERA WILDLIFE WORKS

Project Design Document,
Validated to the
Climate, Community, and Biodiversity Standards (2nd ed)

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Abbreviations

AFOLU	agriculture, forestry and other land use
AGMT	above-ground merchantable trees
AGOT	above-ground non-merchantable trees
APEFE	Association pour la Promotion de l'Education et de la Formation a l'Etranger
BGMT	below-ground merchantable trees
BGOT	below-ground non-merchantable trees
CCB	climate, community, and biodiversity
CCBA	Climate, Community, and Biodiversity Alliance
CLD	local development committee (comité local de développement)
CEPAS	Centre d'Etude Pour l'Action Social
COMIFAC	Comission des Forêts d'Afrique Centrale
CRA	carbon rights agreement
dbh	diameter at breast height
DRC	Democratic Republic of Congo
ERA	ERA Ecosystem Restoration Associates Inc
FCPF	Forest Carbon Partnership Facility
FOB	freight on board/free on board
FPIC	free, prior, and informed consent
GHG	greenhouse gas
GIS	geographic information systems
GL	guidelines
GPG	good practice guidance
HCV	high conservation value
IUCN	International Union for Conservation of Nature
IPCC	Intergovernmental Panel on Climate Change
ICCN	Institut Congolais pour la Conservation de la Nature
MBG	Missouri Botanical Garden
MECNT	Ministry of the Environment, Conservation of Nature, and Tourism
MOU	memorandum of understanding
MRV	monitoring, reporting, and verification
NER	net GHG emission reductions and removals

NPV	net present value
NTFP	non-timber forest products
ODA	official development assistance
OSFAC	Observatoire Satellital des Forets d'Afrique Centrale
PDD	project design document
PIR	project implementation report
PRA	participatory rural appraisal
REDD	reduced emissions from deforestation and degredation
SOC	soil organic carbon
SODEFOR	Société de Développement Forestier, or Forest Development Corporation
SOFORMA	Société Forestiere et des Matieres Ligneuses Africaines
VCU	verified carbon unit
VCS	verified carbon standard
WP	wood products
WW	Wildlife Works Carbon LLC
WWF	World Wildlife Fund

GENERAL SECTION

G1. Original Conditions in the Project Area

G1.1. Project Area Location and Basic Physical Parameters

[Describe] the location of the project and basic physical parameters (e.g., soil, geology, climate).

The Mai Ndombe REDD project area is located in the central part of the Congo River basin of the Democratic Republic of Congo (DRC, formerly Zaire). Administratively, it is located in the province of Bandundu, District of Lake Mai Ndombe, and the territory of Inongo, and encompasses three sectors: Ntomba, Baselenge, and Bolia. The conservation concession covers 299,645 hectares (ha) of *terra firma forest* (upland non-inundated forests), *swamp forest* (inundated and seasonally inundated forests), *savanna*, and *inundated grassland* (see section G1.2 for further definition of these land cover types). The concession is located approximately 395 km northeast of the national capital, Kinshasa. It can be accessed from Kinshasa by air via the town of Inongo, by boat along the Congo and Fimi rivers, or by land via a recently repaired road that runs from the village of Selenge southward through Bandundu province to Kinshasa. The concession runs along the western shore of Lake Mai Ndombe (formerly Lac Leopold II), with the nearest major population center of Inongo (pop 110,000) situated 20 km across the lake and accessible to the concession by boat. The project area is bound between 1°43'S, 17°50'E (NW corner), 1°43'S, 18°00'E (NE corner), 2°23'S, 18°15'E (SE corner), and 2°22'E, 18°00'E (SW corner).

Figure G1.1 The Mai Ndombe Conservation Concession in Western DRC

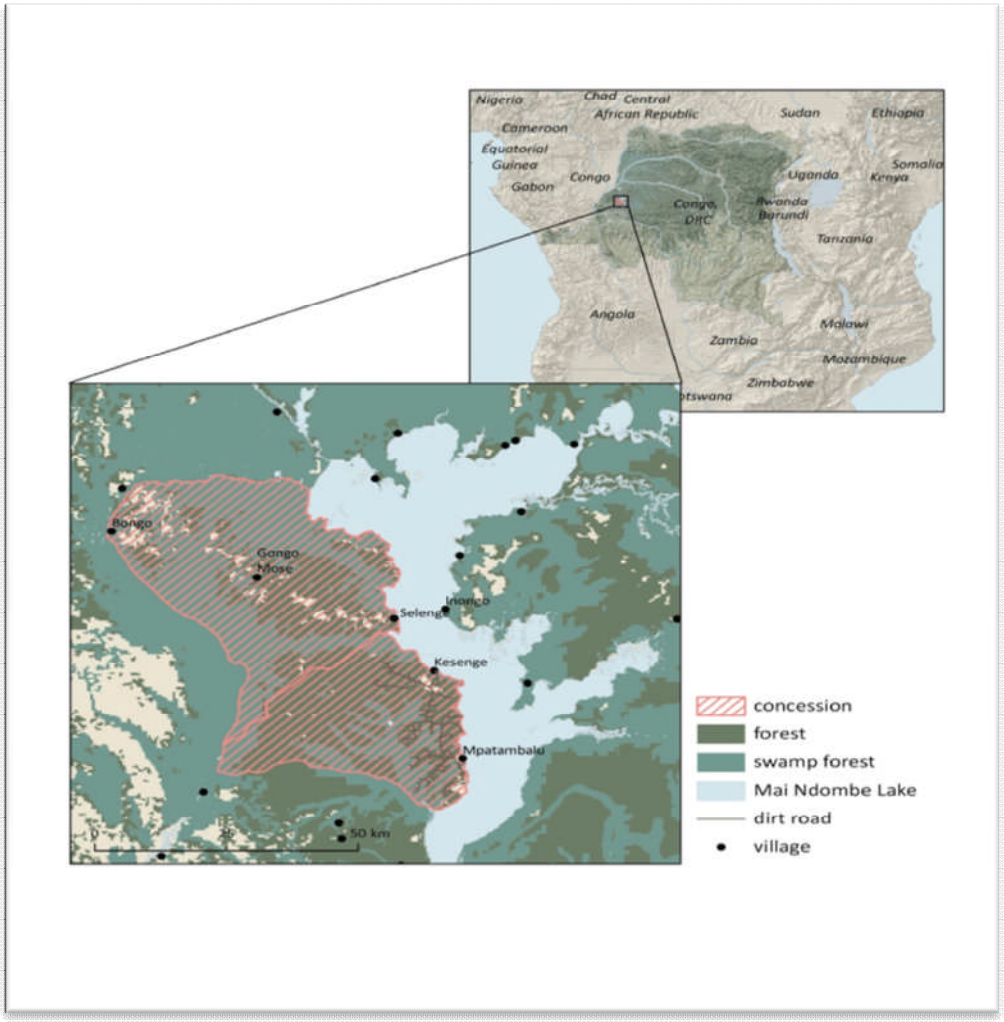
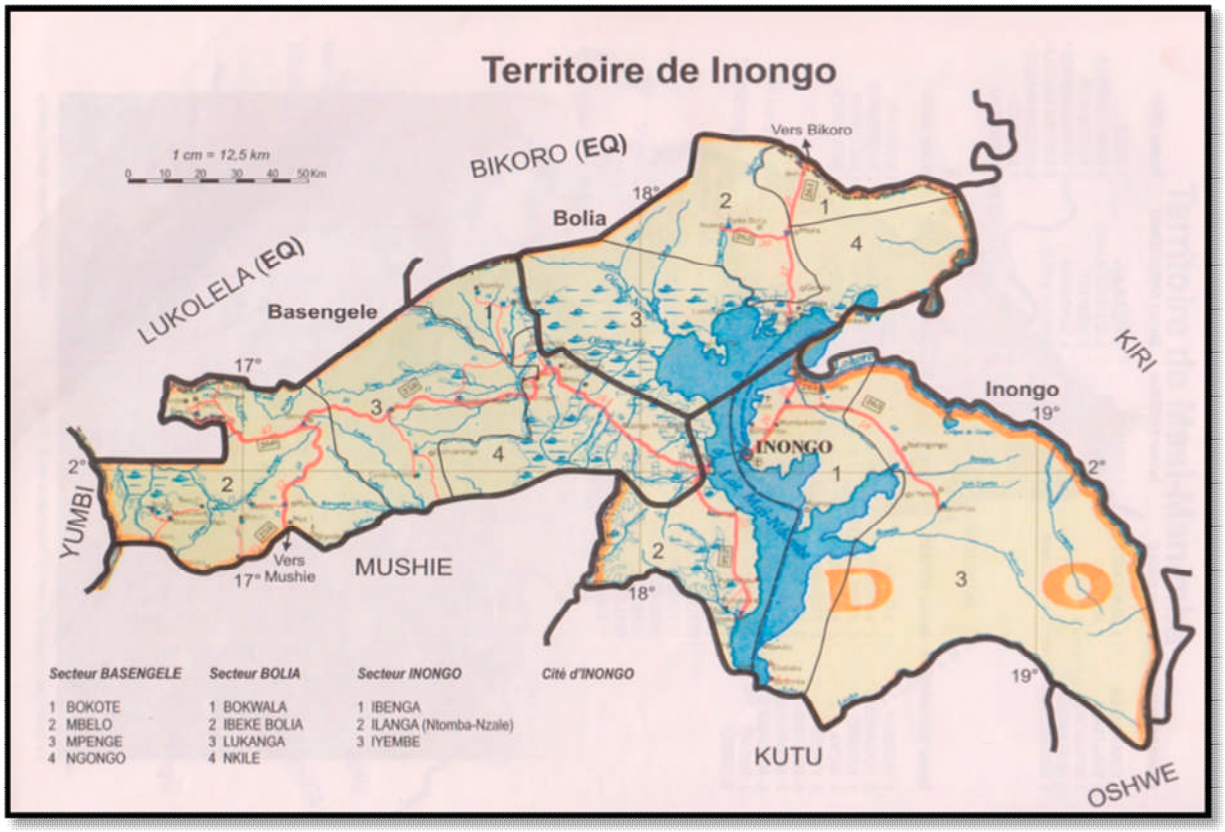


Table G1.1 Project location and administrative jurisdiction.

Concession Size	299,645 ha
Province	Bandundu
District	Mai Ndombe
Territory	Inongo
Sectors	Ntomba, Baselenge, Bolia
Groupements*	Lokanga, Ngongo, Ntomb'enzale

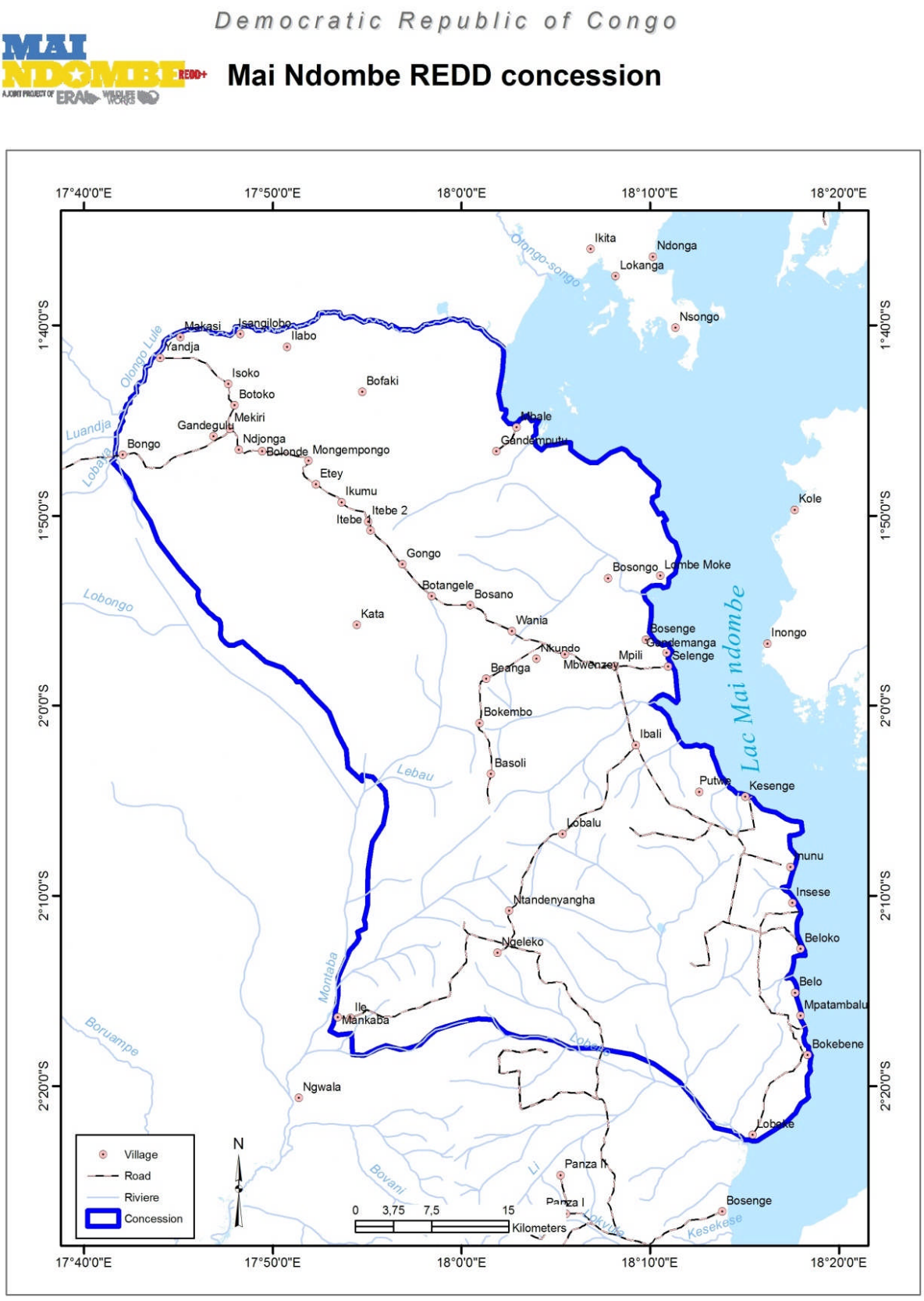
*The lowest level of government in the DRC.

Figure G1.2 Territory of Inongo



Source: Centre d'Etude Pour l'Action Social (CEPAS) Fonds de plan de l'Institut Geographie du Congo, 2005.

Figure G1.3 Project Area (blue border) With All Villages, Roads, and Waterways



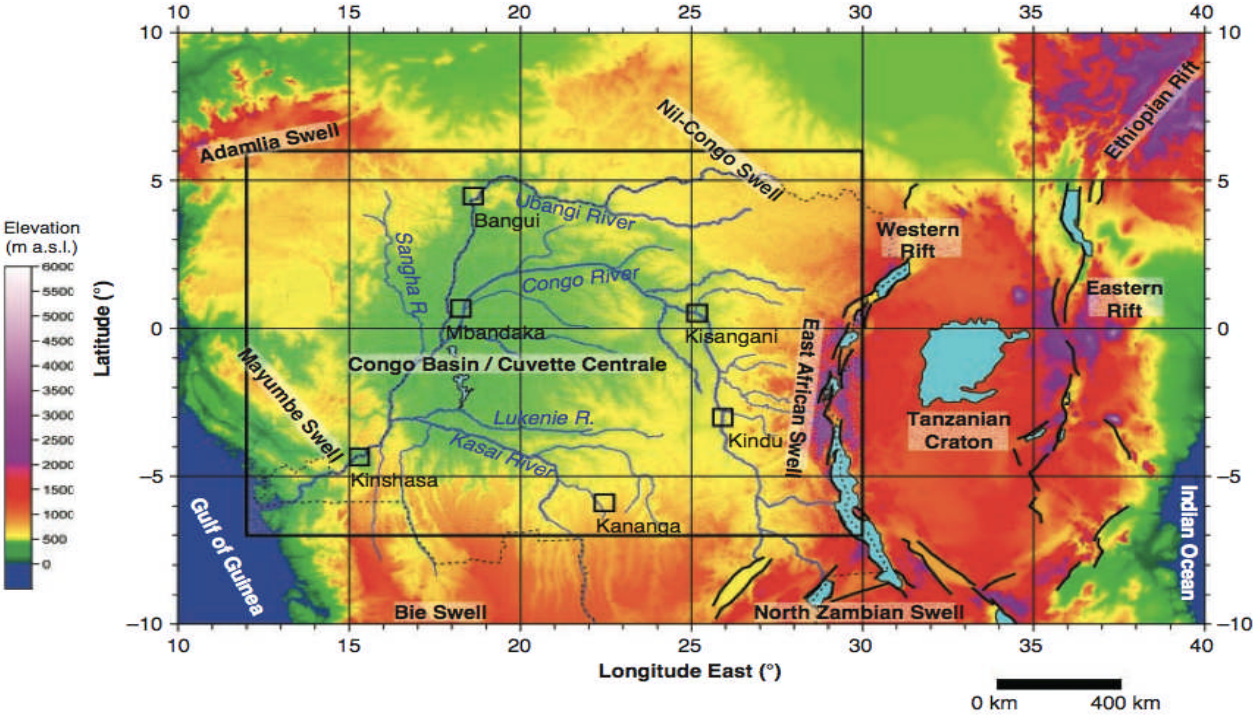
Geology

The low-lying central part of the Congo Basin, or Cuvette Centrale, refers to the present-day 1.2 million km^2 bowl-shaped depression covering most of the DRC and the Republic of Congo and accounting for 10% of the area of the African continent (Evrard, 1957; Chorowicz et al., 1990; Daly et al., 1991, 1992). It is a shallow, westward sloping infra-Cambrian to recent basin with little variation in relief (Chorowicz et al., 1990; Daly et al., 1991, 1992). The geologic origin of the basin is a protezoic (550 million years ago) failed riftline and/or foreland basins, and subsequent thermal relaxation punctuated by two regional deformational episodes, one in the late Cambrian (early Paleozoic) period and the second in the late Permian-Triassic (late Paleozoic) period (Kadima et al., 2011). Both episodes resulted from NE–SW contraction, with the late Paleozoic episode being a reactivation of the early Paleozoic structure (Daly et al., 1992; Kadima et al., 2011).

During the Pan-African tectonic event, compressional folds developed in the Katanga region approximately 1000 km southeast of the basin, and in the Bas Congo region approximately 200–400 km west of the basin. A 210 m thick carbonate-evaporite salt sequence was deposited in the basin during the Neoproterozoic period that remained intact, followed by two clastic sedimentary rock sequences totalling 700 metres during the Paleozoic era (350–550 million years ago) and Meso-Cenozoic era (1–350 million years ago). A succession of 1 km thick continental deposit separated by peneplation surfaces emplaced in a slow subsidence process during Cretaceous and Cenozoic (Giresse, 2005; Kadima et al., 2011). Since the Cenozoic, the central basin acquired the form of an internal sag basin, from which the term Cuvette Centrale was derived. This cuvette defines the hydrologic basin of the Congo River and is surrounded by topographic highs interpreted as swells which form the three other geophysical regions of the Congo (Burke et al., 2003; Burke & Gunnel, 2008; see Figure G1.4).

Figure G1.4 The Geography and Hydrography of the Congo Basin

Source: Burke and Gunnell, 2008



Geomorphology

The project site comprises a very gently rolling or essentially flat landscape at 300–320 metres above sea level. The lowest elevations are on the east side of the site, down to the average lake level at about 300 metres. The highest elevations are in the northwest part of the site. The project lies in the drainage basin of the Kasai River, which lies to its south, where it runs approximately 5 km from the south end of Lake Mai Ndombe and drains east to west into the Congo River. The project site is also weakly connected hydrologically during times of high water, with the Lake Tumba drainage system through the Bolong'o Nsongo and Lobambo rivers drainage systems to the northwestern edge of the concession and through the Lolo and Lotoy to the northeast. Lake Tumba lies in the direct Congo River drainage, and is located approximately 12 km from the Congo River.

Lake Mai Ndombe, which literally means 'Lake Water Black,' is a shallow (1–6 m deep), brown-coloured-water lake with dissolved phenolic acids from decomposed organic matters. There is a lack of clay particles, which otherwise would have contributed to adsorption of these acids.

Soil

The soils of the Lake Mai Ndombe area originate from the Busira geological system. Based on information from the 1998 World Soil Resources Map of the UN FAO, the DRC central cuvette is largely underlain by ferralsols (oxisols in USDA soil taxonomy). Ferralsols are extremely weathered soils characterized by the dominance of kaolinite clays, residual lateritic accumulation of iron and aluminium oxides along with manganese, a stable soil structure, a low silt/clay ratio, and a very low ion exchange ratio. They are deep to very deep in profile and generally show yellowish or reddish colours. Ironstone nodules and ironpans are common, and the soil is liable to contraction and crusting under heavy machinery. Phosphate and lime application may be necessary for productive agriculture.

Climate

The climate of the region is a pre-sudanian warm and humid climate with two wet and two dry seasons. Average rainfall is approximately 1800 mm per year in 115 days, with a mean temperature of approximately 25 degrees Celsius with little temperature variation throughout the year (Bultot, 1974; Bwangoy et al., 2010). The major rainy season starts in September and lasts until the end of November, and the minor rainy season is experienced from the first half of March to the end of May. The minor dry season starts in December and ends in February, and the major dry season occurs in June to August (Samba et al., 2008; Bwangoy et al., 2010). Based on the Koppen-Geiger climate map, the area is Aw, equatorial winter dry, and adjacent to a band further north of Af, equatorial fully humid.

G1.2. Types and Condition of Vegetation within the Project Area

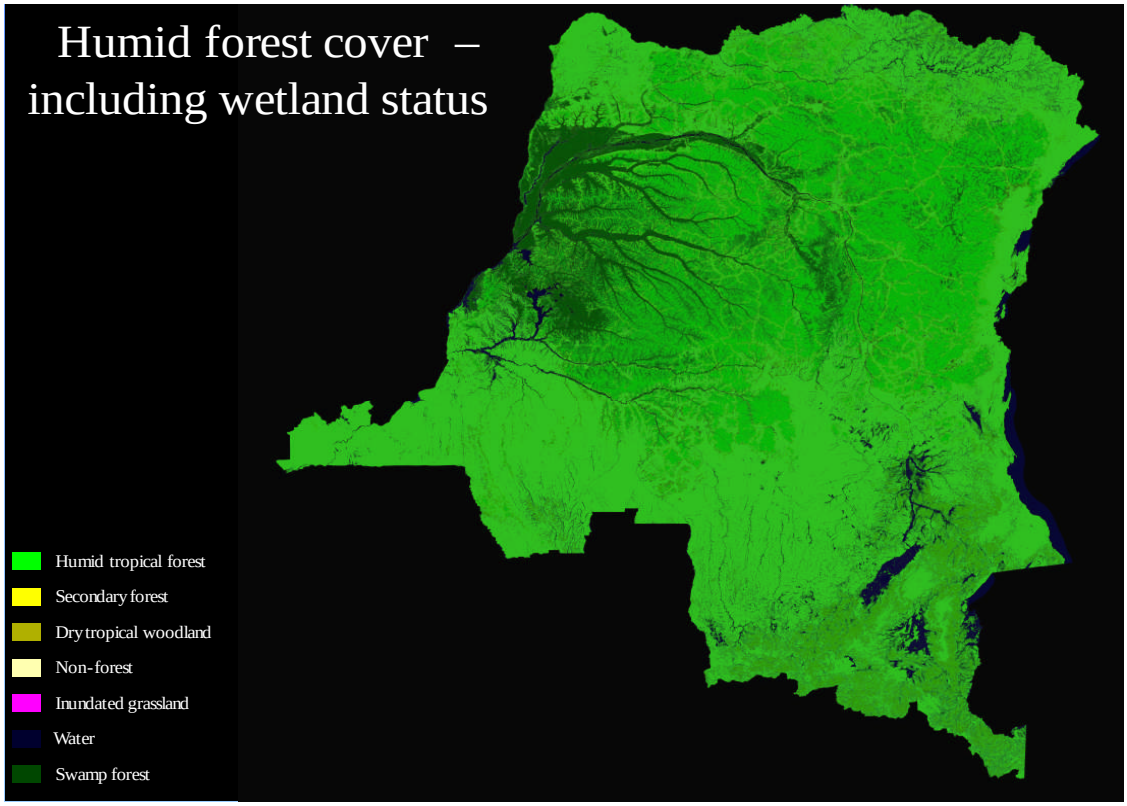
[Describe] the types and condition of vegetation within the project area.

The project area is 93% forested, with dense semideciduous *terra firma* forest (also referred to as upland forest) representing half of the total area. Swamp forests (permanently inundated or seasonally inundated forests) represent 45% of the total forested area, or 41% of the project area. Unlogged (other than some local non-commercial cutting for construction, with planks sawn in place) primary forests comprise a portion of the terra firma (or upland) forest, 24–28% of the project area, and are mainly located in the northern half of the concession. Disturbed primary forests that were selectively logged comprise another portion of the terra firma forest, 20–24% of the project area, and are mainly located in the southern half of the project area. These areas were selectively logged over a period of several

decades in designated parcels in the 1920's, again in the 1980's–1990's, and most recently from 2000–2009 (Lumbuenamo, 2006).

Secondary forests, covering 2–3% of the project area, are previous upland forest areas that are currently regenerating to forest cover after being utilized for swidden-type agricultural practices (Bwangoy et al., 2010). These forest types are located in close proximity to villages, roads, and waterways as adventitious clearings. They span a wide range of vegetation states, from partial openings with tree canopies intact (typically dominated by *Musanga cecropioides,* Ntomba name: Mugunga, to bushy fallows that rarely exceed 10 m in height. Grassland savannas account for approximately 7% of the natural vegetation of the site and are mainly located in the northwestern to north-central concession area and in scattered remnants in the south. See section G1.7 for a more in-depth description of ecosystem and habitat types.

Figure G1.5 Forest Cover of the Democratic Republic of Congo



Source: Potapov et al., 2012; Bwangoy et al., 2012

Vegetation Associated with Semideciduous Terra Firma (Upland) Forests

Terra firma (upland) forest is dominated by large deciduous tree species that shed their leaves during the dry season, mixed with evergreen species in the upper canopy layer (Lebrun & Gilbert, 1954; White, 1983; Mayaux et al., 2000). This highly heterogeneous upper canopy layer is composed of evergreen and deciduous, shade-tolerant species that can reach 35 to 45 metres in height. The crown canopy is irregular and very dense (70–100%). The upper canopy layer, totally closed during the rainy season, can become slightly open during the dry season when some species shed their leaves. This favours the development of shade-tolerant species in the lower canopy layers that have two individual strata composed mainly of regenerating upper canopy layer species (Lebrun & Gilbert, 1954; Mayaux et al.,

2000; Bwangoy et al., 2010). The forest floor is composed of a deep humus layer and supports somewhat sparse but regularly distributed herbaceous vegetation.

The forests of the Guineo-Congolian Forest Region (White, 1983) are characterized by a dominance of legume trees (Fabaceae) of the subfamily Caesalpinoideae, and in fact the highest diversity of genera in the world for this very important group is found in this part of Africa. Also co-dominant in the forests of this region are trees of Meliaceae (the mahogany family), Clusiaceae (the mangosteen family), Sapotaceae (the sapodilla or chicle family), and the other two subfamilies of Fabaceae (Faboideae and Mimosoideae), all of which include a number of commercially important tropical timber trees. According to numerous forest inventory results, the terra firma forest of the western Lake Mai Ndombe area has a clear dominance of *Millettia laurentii* (Fabaceae subfamily Faboideae, Ntomba name: Wenge), at least two species of *Entandrophragma* (Meliaceae, Ntomba name: Ipake), *Ongokea gore* (Olacaceae, Ntomba name: Beloko), and *Tessmannia africana* (Fabaceae Subfamily Caesalpinioideae, Ntomba name: Wamba).

The understory layer is floristically distinct from the upper layers of the forest and is dominated by monocots, including species of *Commelinaceae* (the day-flower or Tradescantia family) and Marantaceae (the prayer plant family), and some dicot species such as *Piper* (the black pepper family), along with seedlings of the canopy and subcanopy trees and lianas (lianas are a thick, woody climbing vine.

The main timber extracted during logging activities was *Millettia laurentii* (Ntomba name: Wenge), species of *Entandrophragma* (Ntomba name: Ipake), and two species of *Guarea* (Meliaceae family, Ntomba name: Bosasa) (Lumbuenamo, 2006). This logging reduced the number of stems of the larger size classes. Some differences in vegetation were encountered between disturbed and undisturbed primary forests (detailed in the Missouri Botanical Garden report, 2012). A comparison of unlogged to logged sites revealed a reduction in canopy height 20+ metres for logged versus 30+ m for unlogged, and fewer woody species encountered in transects (49 in logged forest versus 59 in unlogged). Also there may be fewer HCV species and subspecies in the logged forest (7 species in logged forest vs. 7 species and 1 subspecies in unlogged), but the sample sizes are small and these numbers may not be significantly different.

The logged forest had fewer lianas (37 stems at Loliba vs. 15 at Inunu), but the number of erect stems is generally similar (209 stems at Loliba vs. 198 at Inunu). The number of stems in the smallest size class (2.5--9.9 cm dbh) is smaller in the logged site than in the unlogged site (194 at Loliba vs. 169 at Inunu), as well as in the next larger size class (10--19.9 cm dbh; 40 at Loliba vs. 29 at Inunu). The unlogged site also had some larger trees in the transects, of 80--165 cm dbh, however it had only two such trees out of 209 erect stems so the sample sizes are not large enough to draw firm conclusions about this. The Mai Ndombe project circular tree plot data also provide a comparison of the logged and unlogged sites. Here, the average stem diameter is generally similar in both areas; however these circular plot data survey a very large area, while the two transects represent a paired sample of similar areas. Data are lacking on the original conditions across the logged area, which may have had larger trees initially, or more large trees of the commercial species that were removed.

Vegetation Associated with Swamp (inundated and seasonally inundated forests)

Swamp forests are an important part of the landscape in the Lake Mai Ndombe area and are located along major rivers. They cover 45% of the forest, or 41% of the total area. They are seasonally or permanently inundated and characterized by soils with poor drainage (Mayaux et al., 2000).

Seasonally inundated swamp forests comprise most of the swamp forests in the project site. They are dominated by large, mostly evergreen trees, many of which have extensive stilt root systems. There is generally one well-defined canopy layer with regular crown cover, and smaller trees, sometimes widely scattered or occasionally forming a sparse lower layer. Lianas are common, including the rattan palms. The forest floor is composed of a deep humus layer and is largely bare of vegetation during most of the year, with seedlings establishing in very large numbers during the low-water periods but few surviving; most of the seedlings are the same species as the canopy trees and lianas. The dominant trees in these forests are *Daniellia pynaertii* (Fabaceae subfamily Caesalpinioideae), *Gilbertiodendron dewevrei* (Fabaceae subfamily Caesalpinoideae), *Uapaca guineensis* (Phyllanthaceae) and *Guibourtia demeuseii* (Fabaceae subfamily Caesalpinoideae, commercial name, Bubinga).

In the site inventoried by Missouri Botanical Garden (MBG), at Banga Likunya, the canopy was 25–30 m tall and dominated by trees of the Fabaceae subfamily Caesalpinioideae (*Cynometra sessiliflora*, Ntomba name: Ebakakongo), Clusiaceae (*Garcinia punctata*, Ntomba name: Bondobondo), and Sapotaceae (*Englerophytum* sp., Ntomba name: Boonya). The middle layer or sparse subcanopy was 10–15 m tall and dominated by *Garcinia punctata* (Clusiaceae, Ntomba name: Bondobondo) and *Cynometra sessiliflora* (Fabaceae subfamily Caesalpinioideae, Ntomba name: Ebakakongo). The transects at this site inventoried 18 different species of woody plants of significant size, which is a relatively species-rich swamp flora. The forests at this site seem well preserved. Human activity here mainly consists of firewood collection, which is probably limited by the periodic flooding, and hunting.

Permanently inundated or floodplain and swamp forests are located along the lakeshore and also along some of the larger watercourses. In the Bosongo site visited during the MBG survey, the vegetation lacked well-defined layer and comprised emergent shrubs, trees, and lianas up to about 10 m tall, mixed with lianescent rattan palms (Arecaceae: *Raphia* spp., *Eremospatha* spp.) to 15 m tall. Lianas are common in this vegetation, including the rattan palms. The larger trees were *Sapotaceae* sp. (Ntomba name: Ilongelonge), *Diospyros* sp. (Ebenaceae; vernacular name unknown), and *Beilschmiedia* sp. (Lauraceae; vernacular name unknown). The water surface is partly covered with floating and emergent herbs. Human activity here includes harvesting of rattan leaves, hunting, and fishing. Hunting was reported here for monkey (Mpunga), antelope (Mbuli), monitor lizard (Lombe), aquatic civet (Nzondo), squirrel (Esende), crocodile (Ngando), and snakes (python, vipers, aquatic species); fishing was reported for tilapia, Misombi, Mongusu, Ngolo, Nzombo, Mpunza, and Mfumbe.

Grassland savannas

These habitats mainly consist of open fields of grasses, sedges, and herbaceous legumes, with a few scattered shrubs and also some scattered termite mounds that support a varied herbaceous and woody vegetation that at least partly escapes burning. Burning is done by local residents twice annually, in March and September, to maintain these areas as cattle pasture.

In the site inventoried, there were only two species of shrubs, *Annona senegalensis* (Annonaceae; vernacular name Elolo in Kisengele language) and *Psydrax parviflora* (Rubiaceae; Kisengele name: Eponi Y'esobe). This low species diversity is typical of this vegetation layer in this habitat. The herbaceous vegetation here was dominated by grasses – *Panicum* sp. (Poaceae, Kisengele name: Nkundu), *Andropogon* sp. (Poaceae, Kisengele name: Lolengelenge), and *Pennisetum* sp. (Poaceae, Kisengele name: Inkanka), along with sedges, both *Carex* sp. (Cyperaceae, Kisengele name: Bonienie; i.e., "a species of Carex") and *Kyllinga* sp. (Cyperaceae, no Kisengele name) – and a few legumes (Fabaceae), here species of *Tephrosia, Chamaecrista*, and *Indigofera*. Human activities in this habitat include, beyond cattle raising, the seasonal harvest of mushrooms and edible grasshoppers and locusts. However, no hunting is done here because the animals have been hunted out. This habitat is

significantly degraded, and no ecological restoration or even basic recuperation will be possible without cessation of the frequent burning.

G1.3. Boundaries of the Project Area and the Project Zone

[Describe] the boundaries of the project area and the project zone.

Project Area Boundaries

The two land-use concessions, converted from timber extraction to conservation-oriented focus, make up the Mai Ndombe REDD project area. The concessions are located on the west shore of Lake Mai Ndombe, as shown in Figure G1.6.

Figure G1.6 The Two Concessions as Located on the West Shore of Lake Mai Ndombe

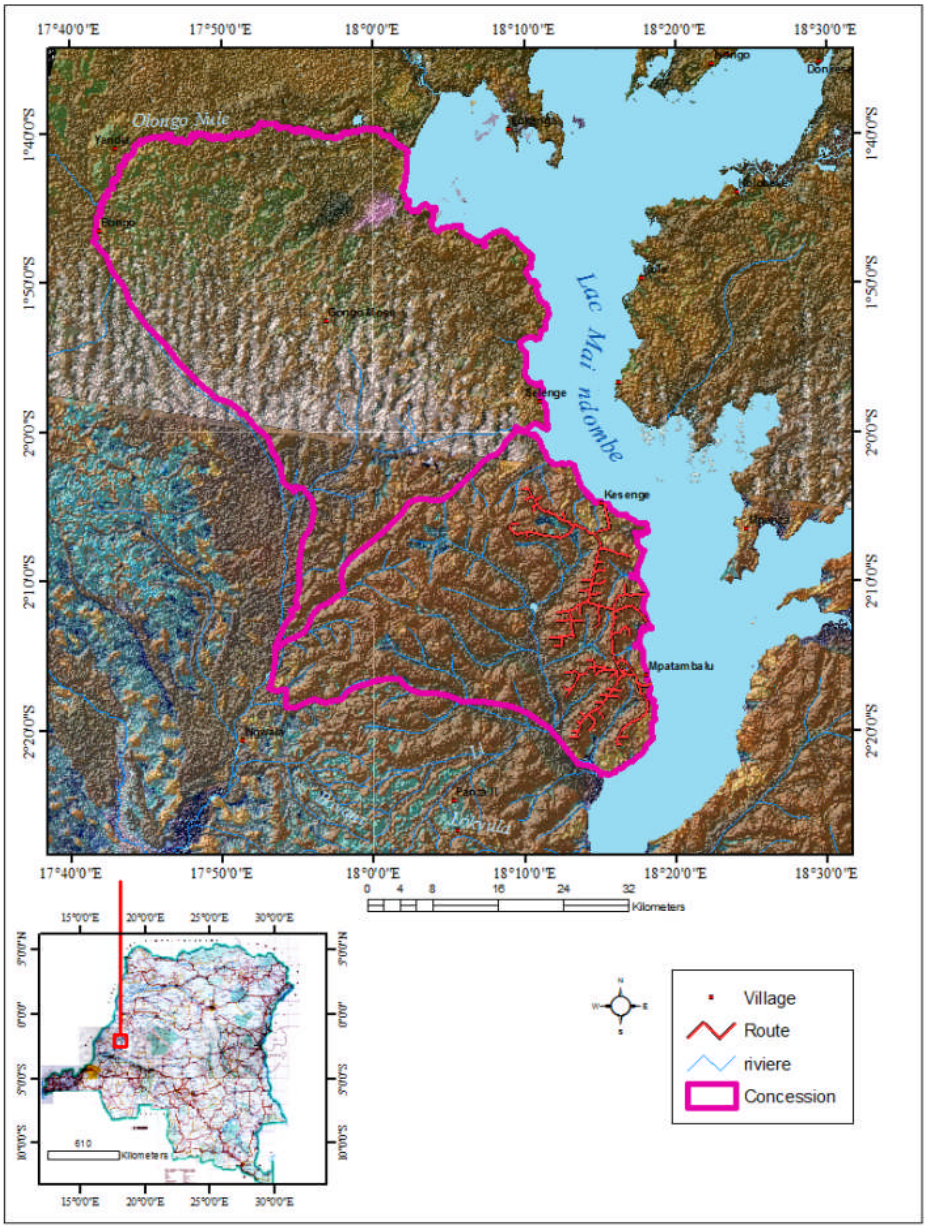


Table G1.2 Project area boundaries.

Boundary	Location
Northern Boundary	Olong'O Lule River
Northern Extent	Lat 1°39'2.87"S Long 17°52'9.95"E
Southern Boundary	Lobeke River
Southern Extent	Lat 2°22'52.04"S Long 18°15'28.95"E
Eastern Boundary	Lake Mai Ndombe
Eastern Extent	Lat 2°19'21.90"S Long 18°18'36.78"E
Western Boundary	Montaba River (which becomes) Boruampe River
Western Extent	Lat 1°45'50.43"S Long 17°41'45.20"E

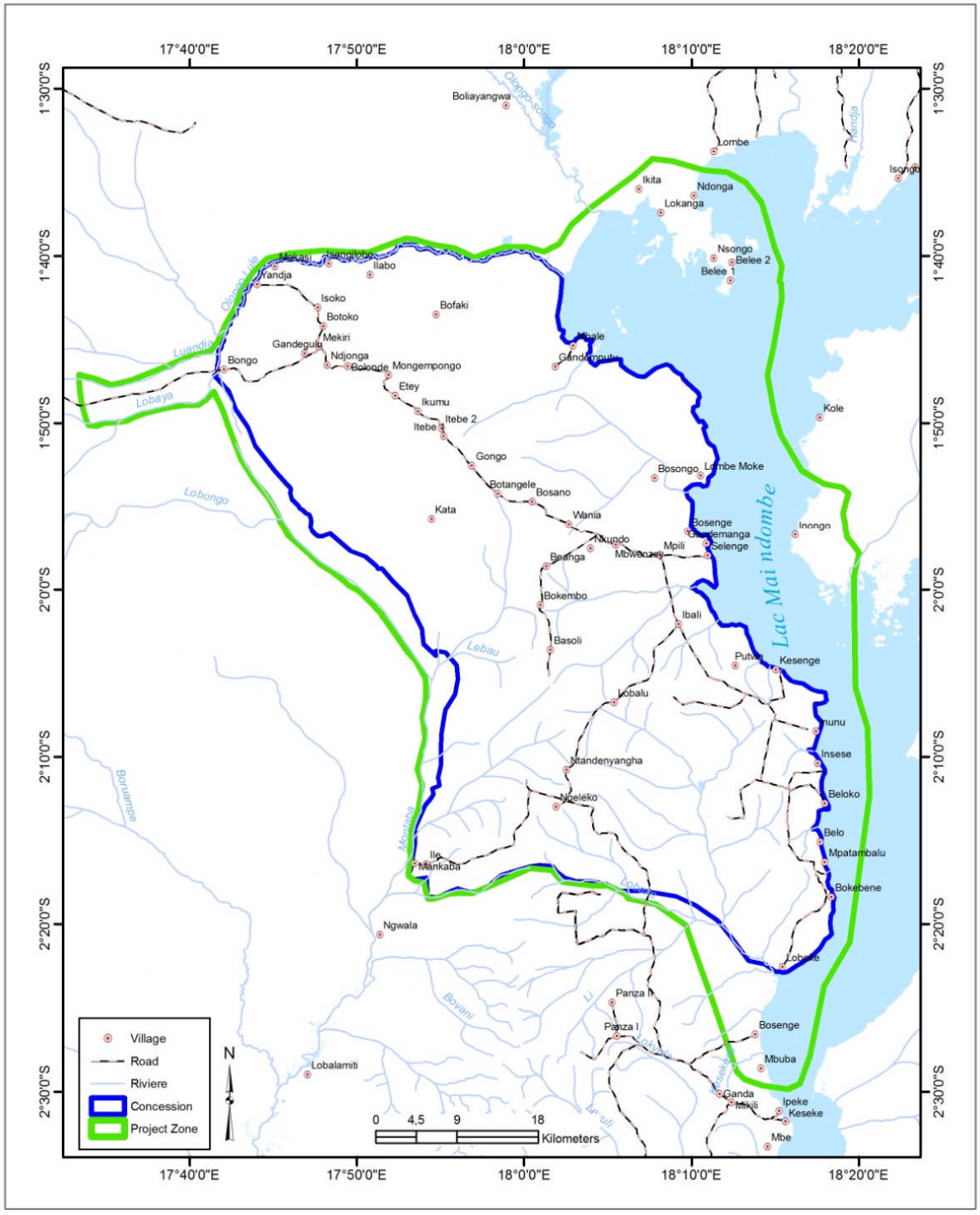
Project Zone

The project area is bordered by rivers or the lake on most boundaries; however, the project proponent has identified a number of villages, identified in Table G1.3 and mapped in Figure G1.7, that may be affected by project activities. Their reasons for inclusion are discussed in Table G1.3.

Table G1.3 Project zone boundaries and justification.

Boundary	Location	Justification for Inclusion or Exclusion
Northern Boundary	Olong'O Lule River	Runs along the north of the project area.
Northern Villages Included	Lukanga, Ikita, Nsongo, Belee1, Belee2, Ndonga	Lokanga is the seat of authority for the Lokanga Groupement. Ikita is a Pygmy village located between the project area boundary and Lukanga. Some project activities will be located in these villages and some migration in and out of the project area may occur.
Southern Boundary	Lobeke River	Runs along the south of the project area.
Southern Villages Included	Bosenge, Mbuba	Much of the Lobeke River is a government-recognized administrative boundary between two secteurs as well as the boundary between two tribes. The villages included in the project zone are the southernmost villages of the Ntomba groupement.
Eastern Boundary	Lake Mai Ndombe	Eastern boundary of project area.
Eastern Villages Included	Inongo	A city of over 100,000 residents, and trading hub as well as the location of the Mai Ndombe project head office.
Western Boundary	Montaba River which becomes Boruampe River	Runs along western boundary of project area.
Western Villages Included	Villages within 15 km on the road running to the northwest out of the project area	The majority of communities outside of the project area are isolated by distance and lack of roads. However, communities located on or near the roads heading northwest out of the project area will be included up to a distance of 15 km (estimated as a day's walk).

Figure G1.7 The Project Zone



G1.4. Current Carbon Stocks in the Project Area

Current carbon stocks within the project area(s), using stratification by land-use or vegetation type and methods of carbon calculation.

Carbon stocks have been estimated using the Verified Carbon Standard (VCS) methodology VM0009, Methodology for Avoided Deforestation, version 2.0. This methodology was originally double validated with VCS in January 2011. Version 2.0 was double validated and approved on October 26, 2012.

Table G1.4 shows current carbon stocks within the project area by forest type, as defined in section G1.2. Values below have been calculated using the methods of carbon accounting detailed in the VCS Methodology VM0009 and the Mai Ndombe REDD project VCS-validated PD.

Table G1.4 Current carbon stocks in project area by vegetation type.

Strata Name	Strata Area (ha)	Average (tCO_2e/ha)	Total Carbon Stocks (tCO_2e)
Semi-deciduous forest, Logged FORESCOM	55,244.8	1,135.7	62,743,323
Semi-deciduous forest, Logged SOFORMA	23,205.0	942.7	21,875,755
Semi-deciduous forest, Unlogged	49,476.7	1,054.5	52,172,530
Swamp Forest	121,030.0	1,052.4	127,375,122
TOTAL:	**248,956**		**264,166,731**

G1.5. Description of Communities in the Project Zone

[Describe] communities located in the project zone, including basic socio-economic and cultural information that describes the social, economic and cultural diversity within communities (wealth, gender, age, ethnicity, etc.), identifies specific groups such as Indigenous Peoples, and describes any community characteristics.

Demographic Information

According to the 2010 administrative census, the total population in the project area is approximately 32,000 people living mostly in more than 30 villages. Table G1.5 describes population by age and gender for each of the major 23 villages. Other, smaller villages are often dependant on and interlinked back to the main villages or are small, camp-like villages; as such, there are likely many more than 32,000 people living in the project area.

Table G1.5 Population by gender and age for each of the 23 major villages.

N°	Village	Men	Women	Boys	Girls	TOTAL
1	Lobeke	569	806	640	660	2675
2	Bokebene	106	139	630	608	1483
3	Mpatambalu	254	315	297	326	1192
4	Kesenge	484	695	516	573	2268
5	Bakele	78	96	117	167	458
6	Lobalu	76	91	113	136	416
7	Tandenianga	37	50	54	46	187
8	Ngele Kulu	61	70	60	65	256
9	Ibali	188	136	158	168	650
10	Selenge	674	629	1070	1184	3557
11	Mpili	588	634	777	782	2781
12	Wania	120	137	144	155	556
13	Ngongo	234	2679	3064	3527	9504
14	Mbwenzey	126	148	192	200	666
15	Bosongo	116	124	126	143	509
16	Ngandomanga	73	74	139	106	392
17	Kengela	49	53	64	83	249
18	Ntuku	48	58	85	121	312
19	Bobola Mpinga	27	34	68	79	208
20	Nkondi	76	99	258	269	702
21	Mbale	578	583	639	712	2512
22	Inunu	21	24	36	36	117
23	Bamboka	45	46	37	46	174
TOTAL		4,628	7,720	9,284	10,192	31,824

Source: Ministere de l'Interieur et Decentralisation de la RDC (2011).

Tribal and Administrative Organization

The traditional political organization recognizes the tribe as the center of political activities. Every tribe member is assumed to belong to the same ancestor. The tribal chiefs (Nkumu) are invested by the Great Spirit of the Lake Mai Ndombe, Mbomb'ipoku (literally, the lord of the abyss), from which they hold mystical religious power. The chiefs are often, but not always, men and are chosen by demonstrating miracles in the days before a new chief is to be chosen. Their main duties are to protect the people and the land and to bring fertility to the soil and the rivers. The succession is rotational between a number of clans in all of the chiefdoms. Some clans can have authority over more than one of the chiefdoms.

The tribal chief (chef de groupement) holds authority over the people, the spirits, and the land. Each village also has a second kind of chief, chief of the land, whose power is recognized by the tribal chief and the state. This person is also a Nkumu and the tribe's chief representative in the village, with the role of protector of the land and the power to sign agreements on behalf of the people. Some village chiefs have authority over more than one village.

The tribal chief is also the chief of the lowest administrative unit recognized by the government of the DRC. She or he has a tribal council composed of members from the ruling clan and the three other clans that may pertain to the power. The chief's office is an open house (hangar) to make sure that all

decisions regarding the land and the people are taken in public and made public. Council members are decided by meeting a series of criteria.

There are three tribal groups in the project zone: the Ntomba, Bolia, and Sengele. Each of these groups belongs to a *secteur* (an administrative subdivision) of the same name. These communities are also part of three *groupements* or chiefdoms (see Figure G1.8). A groupement is a subdivision of the larger secteur; they are also generally homogenous traditional communities organized by custom and headed by a chief. They are recognized by the provincial governor and are the smallest administrative subdivision in the DRC. The three tribal groups belong to the following groupements: Lokanga (Bolia tribe), Ngongo (Sengele tribe), and Ntomb'enzale (Ntomba tribe).

The Bolia and Sengele belong to the broader Mongo ethnic group. The Ntomba identify as part of the Ngala ethnic group and descendent of Banunu, with whom they share social and economic activities (e.g., fishing). However, they are equally tied to the Mongo group, with whom they share language and traditional political institutions.

Socioeconomic activities largely depend on location and tribal origin. Following is a brief description of the characteristics of each of these tribes.

Ntomba

The Ntomba tribe occupies all the land south of Bobola Mpinga village located in the eastern side of the concession between the western shores of the lake to the limit with the Ngongo chiefdom. Fishing and, to a lesser extent, agricultural activities are the main economic activities for this group, the latter dominated by women. The traditional chief of Bosongo, who used to be a tribal chief of his own chiefdom, is now a vassal directly to the chief of Ntomb'e Nzale in Inongo. He still holds power in a number of villages that used to belong to his chiefdom in the northern part of the Ntomba chiefdom. The tribe is also administered through a network of village chiefs who are also representatives of the Ntomba tribe chief. It is also important to indicate that the Bosongo clans are part of the ruling tribes in the Lokanga chiefdom.

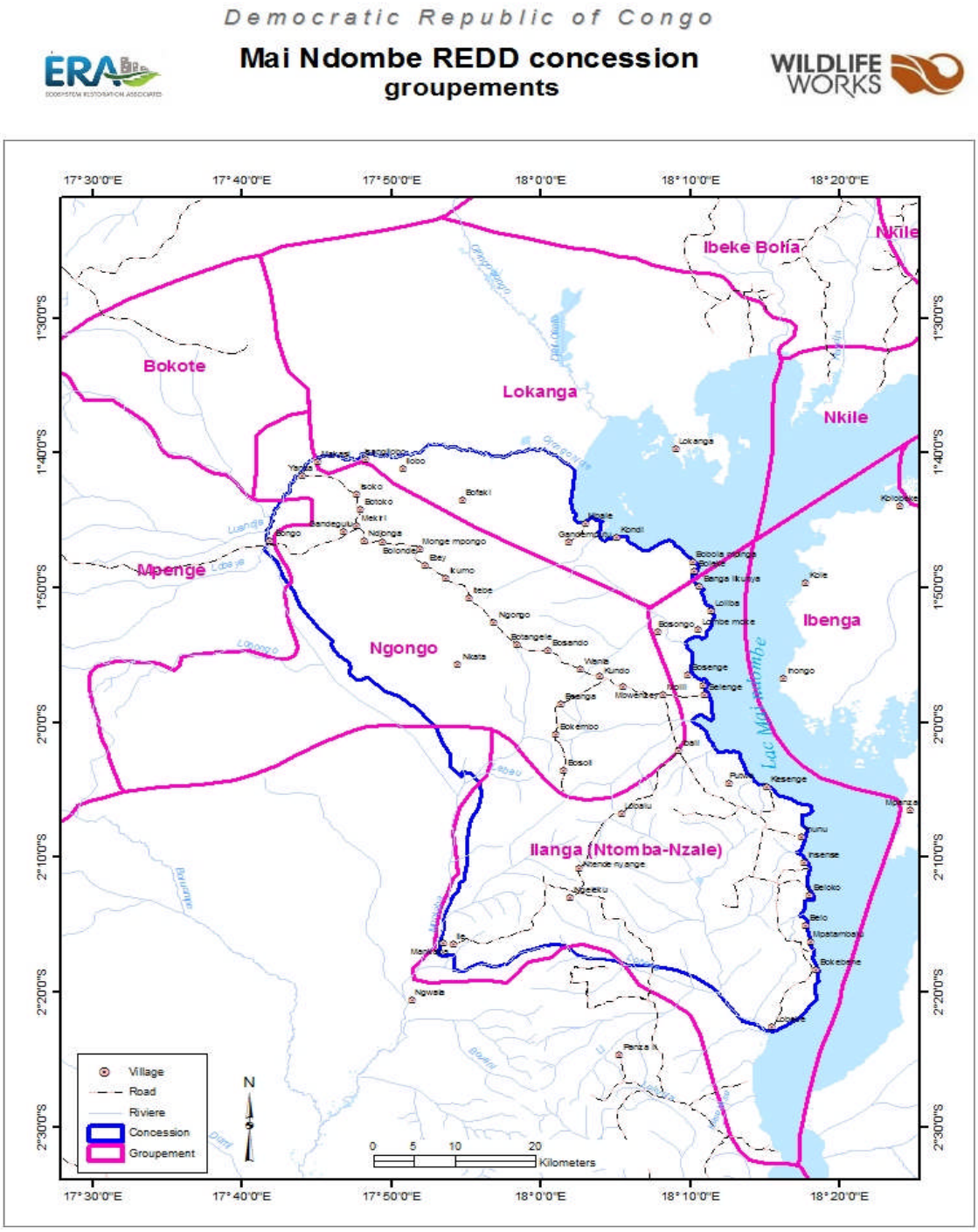
Bolia

The Bolia group occupies all but one village north of the Bosongo River. They are Mongo in origin, for whom agriculture is the most important activity. However, they are related to the Nunu group and therefore also partake in fishing activities. They belong to the Lokanga chiefdom, and most of the lands belong to the Mbale land chief, a vassal to Etoti, and the tribe chief of the Lokanga chiefdom based in the village of the same name. It is believed that he holds magic power over the land and the people from the great spirit of Lake Mai Ndombe.

Sengele

The Sengele group lives in the heart of the concession lands and they are the southernmost group of the Mongo tribe. Their most important activities are agriculture and, to a smaller extent, cattle grazing in savannas. These savannas constitute the most important part of their landscape. The chief of the Sengele group is Mbwa e Ngongo (literally, Ngongo's dog), who also holds magic and religious power over the land and people. The lands are administered by a network of village chiefs who have power over the land and act on behalf of their people with a mandate from the great tribe chief of the Ngongo chiefdom.

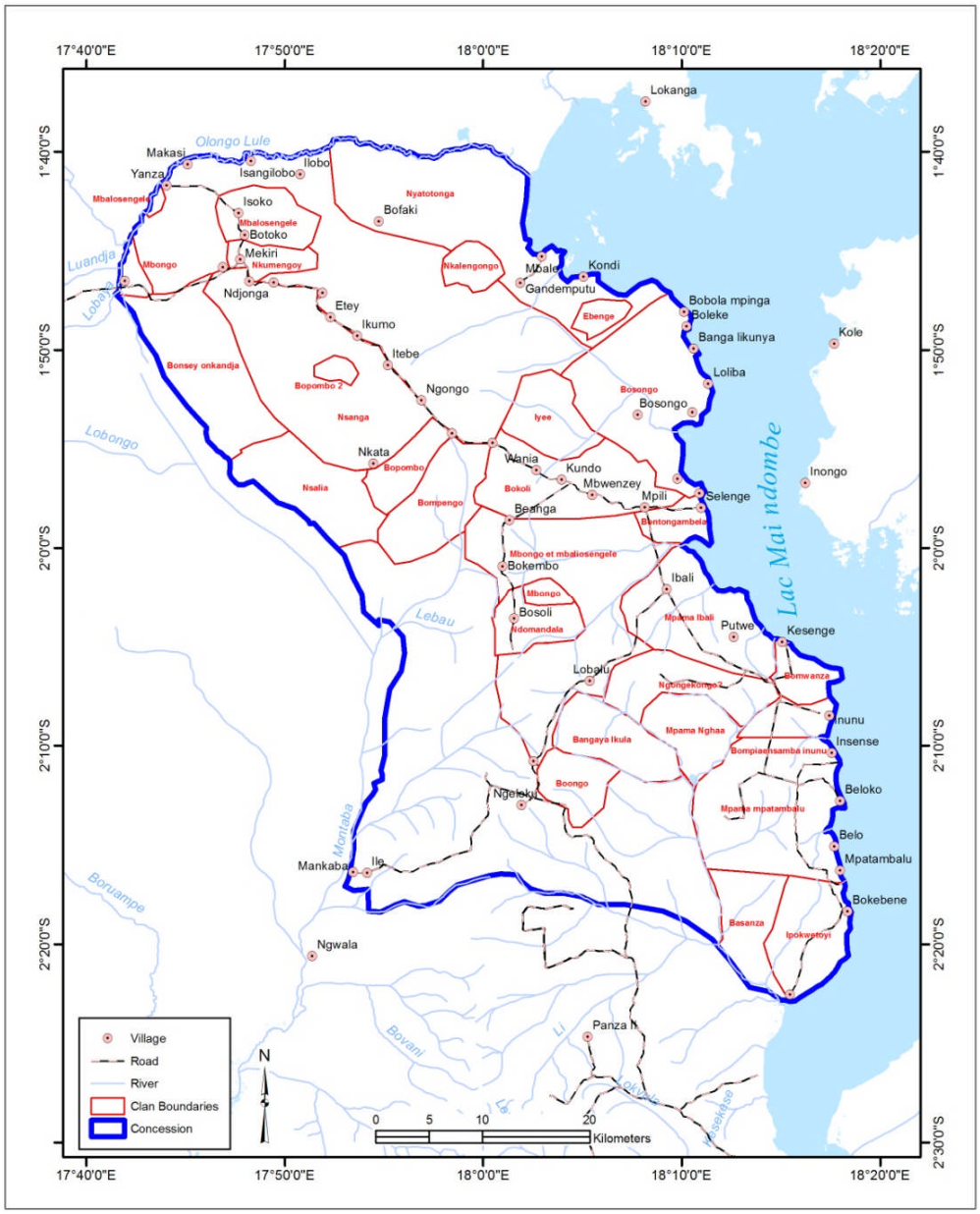
Figure G1.8 Concession Area Boundaries and Groupement Boundaries



Pygmy

The Pygmy people live in Ikita in the Lokanga groupement. This group of people originates from the Lake Tumba region, northwest of the project area. Historically, Pygmies have lived in a healthy and symbiotic relationship with the forest as hunter-gatherers. Although considered to be inferior by their neighbours,

Figure G1.9 Clan Boundaries as Defined by the Chiefs of the Land



the Bantu majority, the Pygmies benefited from a reciprocal relationship with the more agriculturalist Bantu society. As populations grew, and logging and other resource extraction has reduced their traditional areas and access to game for hunting, this traditional relationship between the Bantu and the Pygmy has degenerated into exploitation and servitude and has left the Pygmies on the very edge of an already vulnerable population in the region. The first participatory rural appraisal was carried out in Ikita; it found serious social inequalities within this community and that their basic human rights and freedoms were frequently denied.

Very little agriculture is practiced by the Pygmies because traditionally they are hunters and as well they are not allowed to own or work the land. In Ikita, 99% of the men are subsistence hunters. There are no

schools or clinics in the village and illiteracy is 100%. They have little to no access to money and the barter system is practiced by 98% of those surveyed. Shortly before the project visited the village, they were raided by a neighbouring village and all of their food and clothes were taken. This is a common occurrence.

Clans

An important traditional forest management group to note is clans. According to regional custom, forests are owned by clans and administered by a chef de terre (land chief) in the name of the clan. All activities that take place within these forests must first be given permission by the chef de terre. Before the Mai Ndombe project began, all project area clans were consulted and gave their permission for the project to continue (see section G3.8). Figure G1.9 shows the traditional clan boundaries as determined through workshops with all of the project area chef de terre (see section G3.8).

Current Socioeconomic Conditions

The current social conditions for the approximately 32,000 people living in the Mai Ndombe project area can be described as extreme rural poverty (Loyombo, 2012; project proponent observations in the previous 3 years; participatory rural appraisals (PRAs) described in section G3.8). Employment other than through subsistence fishing and farming is extremely low (Nelson, Kipalu and Vig, 2012; Loyombo, 2012) and the average daily spending of 95% of the surveyed population is less than $.50 (Loyombo, 2012). Selling cassava bread and/or flour is the only source of income for almost all of the villagers apart from seasonal fish during the dry season. Community members struggle to produce enough food to sustain their families, and when a surplus is harvested they struggle to market that produce due to transportation, competition, and lack of demand.

The Sengele and Bolia areas once had a good network of coffee and cocoa plantations that have been mostly abandoned due to the low market prices. The Plantation Reunies de Bandundu (PRB), which owns 25 square kilometres of rubber plantation in the Nselenge, Mpili, and Kesenge triangle, used to be the major industry employing most of the people in the area. Nowadays, it is completely shut down. In the most recent participatory rural appraisal (PRA), 89% of those surveyed reported a regression in wages or other source of income from the previous year.

Children under 5 years old have a 4 in 5 chance of survival. Life expectancy is 47 and 51 for men and women respectively, one of the lowest life expectancies in sub-Saharan Africa (World Health Organization, 2012). A PRA indicates that access to schooling is between 85 and 95% (Loyombo, 2012). Observations show, however, that many students do not attend or are frequently absent, such that it is not uncommon to have children up to 18 years in primary school and up to 30 years old in secondary school (Loyombo, 2012). These circumstances are perpetuated by the extremely low level and quality of public services, such as schools, medical facilities, and transportation infrastructure (Loyombo, 2012). Schools are often constructed of branches and leaves, and classes are observed to be as large as 80 children. Teachers are often underqualified and regularly go unpaid.

Besides the deficient schooling system, the project area is characterized by a dysfunctional health care system. Two major clinics exist in the villages of Ngongo and Lokanga. The Ngongo Secondary Hospital is located approximately 50 km from the city of Inongo; it has a medical doctor on duty who is also the western Inongo territory health commissioner. The Lokanga Secondary Hospital doesn't have a physician on duty. Two nurses are on duty and one of them perfoms basic surgery, specifically for appendicitis and hernia. These two hospitals function in very old "collapsing" buildings and lack the basic equipment and medication for patient care and treatment. The southwestern part of the project area has no viable clinic. The situation is particularly dramatic for the Lobeke village located halfway between Inongo and

Kutu at about 100 km. In this village there is no sense of realistic emergency care due to the distances involved in reaching Inongo or Kutu for any hospital-related case that requires a doctor's attention.

Exacerbating the low access to and quality of health care are poor sanitary conditions and high levels of disease and illness. When asked about the quality of their water, an average of 44% reported that it was bad, and only 13% reported that their water was good to drink.

The population of children in the project area is increasing. Of those communities where census data are available, 61% are children; of the remaining 39%, 56% are women and 44% are men.[1] Communities surveyed in the second PRA reported an average number of children per household of 7, with some households having over 18 children and at least 20% of households having more than 10. Polygamy is a common practice and is a contributing factor to large family sizes. No households surveyed during the 2012 PRA reported having no children.

Through processes of community consultation, participatory rural appraisal, and capacity building workshops, three themes emerged as most important to local communities with respect to their current conditions and well-being. These themes, described in this document as focal issues, reflect factors that contribute to the current socioeconomic conditions. As the Mai Ndombe project activities continue to develop, these focal issues will be reviewed on a continual basis with communities and expanded or revised as more information is collected or as the socioeconomic situation in the project area changes.

The focal issues are:

Access to potable water: A high percentage of people in the project area do not have access to clean drinking water. This problem increases rates of disease and other illnesses and is especially frustrating because the rate of rainfall in the area is so high.

Access to quality health and education: The condition of and access to education and health care are not adequate to meet the communities' basic needs, nor are there currently any initiatives underway to improve this situation.

Food security and economic alternatives: Agriculture is currently at the subsistence level, with little to no surplus and the supply being vulnerable to changes such as those currently being experienced with seasonal weather patterns. As a result, communities are vulnerable and are experiencing high levels of malnutrition. There is very little opportunity for commercialization of excess produce when it does exist, and limited opportunity for economic alternatives in general.

Further discussion and analysis with respect to focal issues can be found in sections G2.4 and C1.

G1.6. Current Land Use, Property Rights, and Unresolved Conflicts

[Describe] current land use and customary and legal property rights including community property in the project zone, identifying any ongoing or unresolved conflicts or disputes and identifying and describing any disputes over land tenure that were resolved during the last ten years.

Land Tenure and Customary Rights in DRC Recent History

Land tenure in the DRC is governed by the 1973 *Land Tenure Law*, which stipulates state ownership over the land. The Land Tenure Law distinguishes and defines a "public and private State land domain" (Art. 54), allowing on the latter a private and/or legal Congolese person to benefit either from a "permanent

[1] Ministere de l'Interieur et Decentralisation de la RDC (2011)..

concession" or an "ordinary concession" on the land, the latter being limited in time to a 25-year period that can be renewed (Arts. 80 and 70 respectively).

The 1973 Land Tenure Law (referenced as 2004 below based on latest publication date) recognizes customary law and rights and defines local community lands as "lands occupied by communities, where those communities live, cultivate or exploit by any means –individually or collectively – and in conformity with local customs" (*Land Tenure Law*, 2004).[2] Nevertheless, the law transferred the lands of those local communities to the domain of the state, whereby the exercise of the right of enjoyment of the lands, as commonly acquired by the local communities, was to be regulated and implemented by presidential decree. This presidential decree was never adopted, leaving the local communities without a legal framework to apply for their right of enjoyment of the lands they occupy. It has led to a situation where in rural areas two legal regimes apply, customary law and written civil law, under which land tenure rights may diverge. According to customary law, local communities believe they are the landowners; however, under state civil law these rights are denied, leading to the potential for conflict between the states and local communities (Musafiri, 2008.)

The 2006 *Constitution of the Democratic Republic of Congo* provides for the decentralization of powers from the central government to the provinces and recognizes customary authority as long as it is not in contradiction with the constitution, laws, and principles of morality. The 2008 *Decentralization Organic Law* complements the 2006 constitution; it organizes provinces, cities, territorial entities including sectors (*secteurs*) or chiefdoms (c*hefferies),* and it defines their respective areas of authority and power (Constitution de la Republique Democratique du Congo, 2006).

A chiefdom is defined as a territory subdivision, which generally are homogenous traditional communities organized by custom and headed by a chief, as designated by custom and recognized and invested by the provincial governor (Constitution de la Republique Democratique du Congo, 2006). The 2008 Decentralization Organic Law lists some items that are under the authority of the chief and its council to rule. However, neither land tenure, land use, nor land planning is under their authority, and thus the law does not legally secure to local communities any land use rights over lands they live on. It aims only to recognize, organize, and allocate some authority to local communities. The project area encompasses three chiefdoms.

Forest Code, Community Rights, and Forest Concessions

Another piece of legislation dealing with land use in forests generally and within the project area specifically is the 2002 *Forest Code*. The aim of the Forest Code is "to foster rational and sustainable management of forest resources to increase their contribution to the economic, social and cultural development of today's generations, while preserving forest ecosystems and forest biodiversity for future generations" (Art. 2).

The Forest Code provides the basic legal framework governing forest user rights in the DRC. Forests are classified according to three broad categories: gazetted forests (primarily for nature conservation); permanent production forests (prioritized for the production of timber or other forest goods and services); and protected forests (for local development, conversion, and other uses; *Code Forestier*, 2002).

The Forest Code includes a number of significant improvements compared to the previous legislation inherited from the colonial period, and it addresses new socioeconomic objectives of the DRC regarding

[2] It is understood in DRC that local communities refer to the term autochthones, or indigenous communities, used during the colonial time; these include Bacwa, Bambuti, Bantous, Batwa, Nilotique, and Soudanais.

the management of forests. Of particular relevance to the Mai Ndombe project, it calls for the development of non-extractive forest uses and for rewarding environmental services, for example, through ecotourism, conservation concessions, and bioprospecting (that is, the process of discovery and commercialization of new products based in biological resources; Art. 87). It also allows for community forests within protected forests, but as yet there are no procedures to enable these to be legally established as long as a presidential decree is not adopted (Art. 22). Nevertheless, the Forest Code requires, for instance, that the environment minister consult with local people before a forest is classified (Art. 15). It also provides that the user rights of local people living in or near a forest are those that result from the local customs and traditions, provided that they are not contrary to the law. This allows the people to collect forestry resources for their domestic, individual, and collective needs (Art. 36). Communities are also able to obtain concessions for community-based management of forests to which they have customary rights pending adoption of an implementation decree (Arts. 22 & 111).

With respect to timber concessions, changes under the Forest Code include a requirement for forest management plans, and new social and fiscal responsibilities are placed on the private sector, including mandatory social responsibility contracts (see Art. 89). The code also provides for 40% of the annual area fee to be transferred to provinces and territories, and specifies that these funds must be used for community infrastructure (Art. 122).

Forest Titles Recent Conversion Process

By 2002, when the Forest Code was drafted, over 43 million hectares were subject to 285 forest contracts and permits with logging companies. Royalties owed to the DRC government under these contracts were often low and many remained unpaid (Hoare et al., 2008). Thus, the government decided first to suspend the issuance of forest titles and second to review all forests titles to assess them in the light of new rules set by the Forest Code. Following a review of the remaining permits, and on completion of all the legal decrees necessary to implement the new code, the remaining valid permits were to be converted into new style forestry concessions, and the suspension lifted.

On May 29, 2002, a formal moratorium was imposed on the issuance of new concessions until new rules for the awarding of forest concessions had been published (*Code Forestier*, 2002b). From the publication of the Forest Code on August 29, 2002, up to 2005, 143 old logging permits were cancelled, while the others permits were reviewed.[3] Nevertheless, in practice and in contravention of the 2002 moratorium and Forest Code, a significant number of concession contracts were awarded during this period.[4] Thus, after May 2002, concession contracts were allocated illegally, creating an unsecured legal environment for their holders.

On October 24, 2005, a presidential decree was adopted that confirmed the May 2002 moratorium and initiated a legal review and conversion of all existing logging titles, including those allocated after the moratorium.[5] In addition, the decree established an interministerial commission to review and convert logging titles, set objective conditions and criteria for the applicants, and establish a right of appeal; it stated that all titles not converted would be void. Results and reasons for denying or not converting old

[3] The Ministry organized logging titles prior to May 2002 into different categories: contracts that remained valid, abrogated contracts, and contested contracts (Inspection Panel, 2007).

[4] 32 contracts covering 4.6 million ha were reported to have been awarded in 2003, and similar transactions took place in 2004 and 2005. Furthermore, some logging permits cancelled in 2002 were rehabilitated in 2004. As well, “swaps” took place in which logging companies exchanged forest areas already logged against new, higher-quality non-logged areas. See World Bank Investigation Panel Report.

[5] Presidential Decree No. 05/116 of October 24, 2005, set out the procedures for conversion of old forest titles into forest concession contracts and extended the moratorium on the granting of logging titles.

forest titles were to be made public for more transparency. The applicant had to submit with its request a "revival plan" that included, among other conditions, the concession limits with regards to rights of use of local communities supported with local community consultations (Art. 7).

On January 19, 2009, the interministerial commission recommended that 65 of the original 152 forest titles be converted to concession contracts and the other titles be cancelled. At the end of the extended process that stretched into 2010, a total of 80 concession contracts were agreed to; the moratorium was lifted in 2011. A 2009 ministerial decree was intended to address situations of forest permit cancellation via a dispute resolution mechanism to ensure compensation to local communities (Republique Democratique du Congo, 2009). Some controversy has arisen regarding the functioning of the legal review process, for example, whether all legal elements of the existing forestry operations were being sufficiently considered and the fact that more titles were converted than those recommended.[6]

The World Bank has financially supported the Forest Code development process under two programs: (1) the Emergency Economic and Social Reunification Support Project (EESRSP) to support the preparation of a zoning plan, and (2) the Transitional Support for Economic Recovery Operation (TSERO) to support policy measures aiming at increasing the impact on the poor of public spending in key priority areas, education, and health; strengthening public expenditure and civil service management; and improving governance in forestry. These programs were challenged under an internal World Bank procedure by an organization representing Pygmies from several provinces and on behalf of affected local communities. This challenge was mainly on the grounds that (1) the World Bank "hastily adopted a Congolese Forest Code" without the participation of civil society or the indigenous communities, (2) zoning of the forests occurs without the consultation and consideration of the indigenous peoples' interests and, (3) as a result, the World Bank will fail to comply with its own safeguard policies on forests, especially those regarding indigenous people.[7]

The World Bank panel in charge of ensuring consistency of its funding programs with its internal policies reached the general conclusion that financial support provided to the legislative reform process, which focused on forest concessions, mostly benefited logging companies (World Bank Inspection Panel, 2007). Furthermore, abandonment of the zoning plan at the time of the complaint meant that "the forest concession conversion process serves as *de facto* zoning under which the legal and economic interests of the logging companies will be considered for long-term recognition, while consideration and recognition of the land tenure and livelihood rights of the people living in the forests or dependent upon them will be delayed" (see above footnote).

As a result of the situation described above, the DRC is left without a basis for formal forest management planning, which could undermine the wide acceptance of logging concessions as well the establishment of tenures for other forest users, such as the establishment of community forests (Counsell, 2006). This situation could result in future conflict if it is not addressed with proper community involvement. As well, the World Bank inspection panel noted in its general conclusion that

[6] See Greenpeace Open Letter to Mr José Endundo Bononge, Minister of Environment, Conservation of Nature, and Tourism, concerning DRC forests – Request for clarification regarding current reforms, July 23, 2009, www.greenpeace.org, and Policy Briefing 33 Governance of Africa's Resources Programme: "Forest Governance in the Democratic Republic of Congo", Joel Kiyulu, July 2011, http://www.saiia.org.za/

[7] Organisation Autochtones Pygmées et Accompagnant les Autochtones Pygmées en République Démocratique du Congo (Indigenous Pygmy Organizations and Pygmy Support Organizations in DRC). On November 19, 2005, the Inspection Panel received a Request for Inspection from this organization on behalf of local communities living in the DRC. Representatives of local communities of Kisangani in the Orientale Province, of Béni and Butembo in Nord-Kivu Province, of Kinshasa/Mbandaka and Lokolama in Equateur Province, of Inongo in the Bandundu Province, of Kindu in the Maniema Province, and of Bukavu in the Sud-Kivu Province, are signatories to the Request.

the benefits from logging are not going to the people living in and around the forests. They found evidence that benefits that are promised to communities through concessions, such as schools, clinics, and other facilities, often don't materialize (World Bank Inspection Panel, 2007). This was generally the case for the concession that was in place for the Mai Ndombe REDD project area prior to the issuance of the current forest conservation concession.

It is in the context of the historical, social, and legal background described above that the current forest conservation concession for the project was established.

Current Project Land Tenure

The project area was previously held by one company, BIMPE AGRO, through two forest permits that were awarded in 1984 and 2000 respectively, when management and logging activities were delegated to the company SOFORMA. BIMPE AGRO issued a request for conversion of its two forest permits, which was made public on April 5, 2006.[8] The two forest permits went through the legal review for conversion under the interministerial commission, which decided to reject the conversion request due to (1) non-payment of taxes, (2) not keeping a permanent functioning log processing unit in the area, and (3) submission of an incomplete revival plan. The decision was made public on November 28, 2008.[9]

On September 25, 2009, SOFORMA submitted a request to the Minister of Environment to swap a concession held by them in the eastern province for the concessions in the current project area. On May 18, 2010, the Minister of Environment agreed to the swap by written letter.[10] However, after further consideration, the Minister signed a carbon rights agreement (protocole d'entente), also called the memorandum of understanding, with ERA on March 14, 2011. ERA Congo, referencing the DRC government's free, prior, and informed consent (FPIC) guidance for REDD projects, also undertook extensive community consultations throughout the project area which culminated in the signing of a cahier de charges on March 26, 2011, with representatives of all the major communities in the project area in the presence of the governor of Inongo territory. This document forms the basis of the project's commitments with regard to the implementation of the socioeconomic infrastructure and social services benefits to be provided to the local communities in the project area. (Also see sections G3.2 and G3.8). It is supplemental to the forest conservation concession contract that was subsequently signed between ERA Congo and the Minister of Environment, Conservation, and Tourism on July 30, 2011.

Legal land tenure within the project area

Grandfathered within the Mai Ndombe conservation concession are three small timber concessions and one rubber plantation. The three timber concessions are *concessions perpetuelles* (perpetual concessions) and were allocated for agriculture and crop production. However, they may be used for artisanal timber extraction. They were allocated by the Ministry of Land before the conservation concession was allocated to the Mai Ndombe project. They are less than 400 hectares each and are

[8] For a full report on the forest title conversion process, see "Conférence de Presse de Monsieur le Ministre de l'Environnemment, Conservation de la Nature et Tourisme sur les Travaux de La Commission Interministérielle de Conversion des Anciens Titres Forestiers en Contrats de Concession Forestière" dated October 6, 2008, at Hotel Venus, Kinshasa, http://www.mecnt.cd

[9] First decision of the commission before BIMPE AGRO appealed the decision. After second review, the commission rejected BIMPE AGRO's appeal on two grounds: (1) non-payment of taxes, and (2) that the operation and functionality of the log processing units were not proven. See interministerial commission conclusions: "Conclusion de la Commission Interministérielle chargée de la conversion des anciens titres forestiers," Tableau récapitulatif par titre des recommandations de la Commission Interministérielle de conversion des anciens titres forestiers après examen des recours, November 28, 2008, http://www.mecnt.cd

[10] See Letter from the Minister of Environment to SOFORMA n°1166/CAB/MIN/ECN-T/JEB/10, dated May 18, 2010.

located near the communities of Bosongo and Mbale; they have been removed from the VCS quantification area. One rubber concession of 731 ha, owned by the Plantations Reunies de Bandundu (PRB), is located near the village of Kesenge.

G1.7. Current Biodiversity in the Project Zone, and Threats to It

[Describe] current biodiversity within the project zone (diversity of species and ecosystems) and threats to that biodiversity, using appropriate methodologies, substantiated where possible with appropriate reference material.

Very little information is currently known about the biodiversity of the project zone. A goal (and activity) of the Mai Ndombe REDD project is to increase the amount of information available on biodiversity in the project area (see section G3.2). This process has already been initiated through the engagement of the Missouri Botanical Garden, who, in conjunction with local DRC affiliates, conducted a coarse-level survey of project area flora and fauna in 2012. The survey results will be presented in the project implementation report (PIR) for the first verification period in 2012. Some of the information from the field work is also presented in this document in sections G1.7, G1.8, G2.5, and B1.

Diversity of Ecosystems and Habitats in the Project Zone

Several ecosystems can be identified on the site. These include both terrestrial ecosystems (see Toham et al., 2006, for overview) and freshwater ecosystems (Lake Mai Ndombe and the riverine systems on the site; see Brown, 2012, for overview). Within these ecosystems there is a range of habitats. Plant species encountered in terrestrial ecosystem types are described in section G1.2, Types and Condition of Vegetation in the Area.

Freshwater Habitats

Lake: Lake Mai Ndombe is similar to Lake Tumba and is a blackwater lake, dependent for nutrients on inputs from runoff from surrounding areas, particularly the surrounding forest, and coloured by tannins from the surrounding vegetation (Brown, 2012). The lake is relatively shallow, not more than 6 m deep. It supports an extensive fish fauna, which includes frequently occurring species of catfish (*Chrysichthys* spp., B. Foster, personal communication). The fish fauna is intensively fished for food locally. The size of the fish currently being harvested is relatively small, and it is likely that the lake is overfished; however, this condition has apparently not yet been assessed (Toham et al., 2006).

Lacustrine: This habitat comprises the lakeshore, approximately 90 km long and located along the entire east side of the project site. Aside from approximately 6 villages or habitation sites located on terra firma shores, the lakeshore supports well-preserved natural vegetation and the majority of it is seasonally to permanently inundated.

Riverine: This habitat comprises the rivers, streams, marshes, and floodplains that are extensively reticulated throughout the project site. These habitats have high integrity and preservation throughout the site.

Terrestrial Habitats

Grasslands *(Prairie Marecageuse, Savane)*: These are remnant grasslands from 3000+ years ago (Toham et al., 2006), which are generally considered to have been invaded by forest and now survive as relicts that are maintained largely by anthropogenic fire (B. Foster, personal communication). In general, these grasslands are connected in a mosaic with the relictual (Toham et al., 2006) or anthropogenic (B. Bwangoy, personal communication) grasslands around Lake Tumba, which still support relictual lion populations. These habitats mainly comprise open fields of grasses, sedges, and herbaceous legumes,

with a few scattered shrubs and also some scattered termite mounds that support a varied herbaceous and woody vegetation that at least partly escapes burning.

Forests: Forests are not well known in terms of biodiversity beyond inventories of the timber. The forests in the study site are rich in plant species, including a number of rare, threatened, and endemic species. Hunting has reduced some animal populations significantly, and patches of forest throughout the project site have been converted to agriculture near roads and villages. One indicator of some ecological health of the forest is the very large seedling populations found in the selectively logged terra firma forest (the Inunu site) of the liana *Gnetum africanum* (Gnetaceae family, Ntomba name: Fumbwa), a species categorized as near-threatened on the International Union for Conservation of Nature (IUCN) *Red List of Threatened Species* (Lakeman Fraser & Bachman, 2011). This is an edible and prized wild plant that is much in demand, and it is highly unusual in the Congo region to find substantial populations of this plant within a half-day's walk of a settlement, while these plant populations are located very close to a village and a port on the lake. These forests are an appropriate target for conservation through protection, and do not appear to need significant restoration work to maintain the plant component of their biodiversity, though some animal populations appear to be significantly depleted and likely need more help to recuperate.

Forests in the project area can be generally separated into two types: swamp forest and terra firma or upland forest. Seasonally inundated or floodplain and swamp forests comprise most of the swamp forests in the project site and are located along the lakeshore and some of the larger watercourses.

Semi-deciduous upland or terra firma forests constitute 46% of the project site and occur in several different successional stages: disturbed and undisturbed primary forest, and secondary forest. Further description of these types can be found in section G1.3.

Species Diversity

Species diversity can be measured in various ways, including the number of species present, or species richness, and the abundance or relative abundance of the various species. The latter requires extensive sampling to support statistical analysis, and such data collection was beyond the scope of the initial site assessment. However, a general survey of the species richness was done, and the identity of many of the species found in the project site was verified and documented (methods described per MBG, 2012).

Plant Species Diversity

The MBG field work was mainly focused on woody plants in five study sites; it documented 162 flowering plant, fern, and gymnosperm species in the project site (Table of MBG Confirmed Plant Species List provided to the validator). Significant additional numbers of plant species can be expected with additional exploration, in particular of the forest understory and epiphytes, including orchids (Orchidaceae), which are currently unsurveyed.

Tree species were inventoried widely across the project site in the ERA circular plot data. This survey found 203 species of trees. In general, the species composition is similar in the logged and unlogged areas, and species of commercial importance and of high conservation value are found widely in both areas. However, these circular plot data survey a very large area, while the two transects represent a paired sample of similar areas. Data are lacking on the original conditions across the logged area, which may have had more species of trees initially, some of which have been lost with the degradation of the forest.

Animal Species Diversity

As a rapid preliminary assessment of animal species diversity, surveys were made of larger mammals and birds in seven different habitats in both upland and swamp forest. In general, animal diversity was not high. The species found during this rapid assessment are listed in the table Animal Species from Fauna Survey provided to the validator.

Mammal observations are summarized in the table Mammal Summary Numbers.xls. The numbers of species and individuals appear to show significant reduction, which is most likely due to local hunting. In particular the *Cercopithecus* species, *Potamocherus porcus*, *Tragelaphus spekei*, the *Cephalophus* species, and *Philantomba monticola* should be present in larger detectable numbers than were found. Surprisingly, we did not find any sign of *Tragelaphus eurycerus eurycerus* (lowland Bongo, an antelope) that should occur in the forest and used to be found there according to local informants. This animal is considered near-threatened globally, with population declines due to hunting and habitat loss, the latter due to both conversion of forest to croplands and commerical logging activities. Another species that occurs in the region but was not detected is *Cercopithecus neglectus* (DeBrazza's monkey). This species is considered of least concern in terms of extinction threat, but it is an important indicator for conservation in the DRC, where it shares its environment with *Pan paniscus* (Bonobo). This species is hunted for bushmeat and also exploited as a pet for its beauty, and its absence here indicates overhunting. It is clear that mammals have been and continue to be heavily hunted in the forest, and some of the species are in danger of disappearing completely.

Humans were also observed during the large mammal surveys, and signs of human presence and activity were found basically throughout the areas studied, which indicates extensive ongoing use and disturbance of the animals. In general in these surveys, the more humans seen, the fewer animals were observed.

Bird observations are summarized in the Table Bird Summary Numbers.xls. The numbers of species and individuals appear to show significant reduction, which is most likely due to local hunting and habitat degradation. In particular the species *Psittacus erithacus* (African gray parrot) and *Bulbulcus ibis* (cattle egret) should be present in detectable numbers, the former in the forest and the latter in swamps, river banks, and lakeshores.

Generally, similar numbers of species and local variation in species composition were found in each of the two sectors surveyed. Mature upland forest was the site with greatest species numbers for mammals and birds, but swamp forests and periodically inundated forests were particular habitats for some bird species. However, the numbers of individuals seen varied widely between the two sectors, mainly due to the presence of occasional large flocks of individual species. In general, the low number of bird species found is probably partly related to seasonality. Certainly the particular bird species found in the surveys as well as number of individuals are related to the seasonal presence or absence of migratory species at the time of the survey, such as *Ardea cinerea* (grey heron).

Threats to Biodiversity

Human encroachment and unregulated, unsustainable use of the land

The results of human encroachment and unregulated, unsustainable land use include deforestation, habitat degradation, habitat fragmentation, habitat destruction, and overhunting leading to severe decline and eventually local extinction of animal populations (Laurance, 2012). These activities impact both overall habitat preservation and the conservation of individual species.

The principal threats to biodiversity preservation and the principal causes of environmental degradation in the nearby Salonga-Lukenie-Sankuru landscape were identified as slash-and-burn agriculture,

commercial hunting, and indiscriminate overfishing (Makombo, 2010). This area is ecologically and socially similar to the Mai Ndombe area, and these threats can be expected in the project site as well. Overall, the main threats documented for preservation of biodiversity throughout central Africa are trade in large vertebrates, logging, bushmeat hunting, burning, and introduction of species new to the ecosystem through interbasin water transfer (Scholes et al., 2006). The last of these is a naturally occurring event and does not seem to represent a significant threat to the site, but the other activities do. Regular burning of part of the project site, cattle husbandry, and extensive hunting activities throughout the project site were reported and observed during the site visit. All of these human activities depend on access to the site, which is somewhat restricted by its large size, the extensive and logistically difficult swamp vegetation along its east side, and the limited number of roads. Roads are known to greatly accelerate all forms of human-caused habitat degradation (Lawrence, 2012), and the project site is crossed by several passable roads; it is also accessible by water from the lake side. Thus in general, human access to the project site is reasonably easy, and the threat level here from human activity is considered high (Toham et al., 2006).

Human activity is expected to be higher closer to settlements, with the largest of these as follows: in the northeastern region a short distance outside the border of the project site; in the east-central part of the site, across the lake from Inongo and around a significant human settlement; in the southwestern corner of the site, near a significant human settlement; in the northwestern corner, where a road enters the site, and along this road from the northwest corner to the east-central part of the site, where the road provides access. Also likely to be subject to human encroachment are various portions of the southern part of the site that are accessible by trails and roads. Human access to the project site by boat is also facilitated by the lakeshore. Control of these activities depends on restriction of access to the project site. However, although agriculture of all kinds, collection of non-timber forest products, forest hunting, and fishing activities affect the natural habitats in the region, they are also often the sole source of protein and income for many people in the area and thus represent a management challenge (Alstatt et al., 2008).

Commercial exploitation of the biodiversity

Commercial exploitation of native wild animals and plants in the project area is ongoing at present. The main activities include logging, both legal and illegal; hunting and fishing of animals for sale locally and in distant settlements for food (including bushmeat), for pets, and for export (e.g., ivory, fur, and other body parts; research animals); and agriculture, in particular, deforestation for cultivation of oil palm and burning of grasslands to maintain cattle pastures. These are the same threats identified regionally (Makombo, 2010). Activities that require permits or legal access to the land can be restricted on the site by the project management, but illegal use is more difficult to control. The level of the threat to biodiversity conservation can be expected to increase in correlation with growth in the world's economy.

Species threatened by commercial exploitation in the project site include the timber trees, in particular those that are considered threatened according to their red list assessments (see section G1.8); animals of reasonable size that are valued as bushmeat, including some species already at risk of global extinction (see section G1.8*)*; fish of reasonable size that are valued for food; and several key species of vertebrates (if, in fact, they are on the site), including bonobos and forest elephants. In particular, the Wenge (*Miletttia laurentii*, or Congolese rosewood) is the most-logged tree species in the DRC (Eba'a & Bayol, 2008) and is in high commercial demand, along with *Milicia excelsa* (Iroko) and several other species. These and several other valuable timber trees are found in the terra firma forests on the project site. Surveys of bushmeat in the market in the Lake Tumba region found the top wild-harvested animal species being sold were monkeys (*Cercopithecus* spp.), the red river hog (*Potamocherus procus*), and the

antelope sitatunga (*Tragelaphus spekei*), followed by duiker, turtle, and fish (Felin & Inogwabini, 2008); the dwarf crocodile (*Osteolaemus tetraspis*) is also widely hunted further north (Felin & Inogwabini, 2008). These or similar species may be expected as the top targets of hunting in the project site, along with various species of fish. The fishing activities apparently have not yet been surveyed.

Local use of native forest products also threatens some plant species. Even though commercial logging has ceased in the project site, logging for local construction materials continues (R.E. Gereau, personal observation). Some wild plants are harvested for food, and in particular *Gnetum africanum*, which is present in the project site, is considered a near-threatened species because its populations have been wiped out in many areas due to overharvesting. Several species of palms are harvested for local use as roof thatch (R. E. Gereau, personal observation), which also can impact the populations of these species.

Climate change
The only available remedial action to counteract future climate changes, given the small size of the project site, its lack of topographic variation, and the relatively short duration of the planned project activites (i.e., short in ecological time), is preservation of all the natural habitats on the project site.

Lack of information about the site's biodiversity
Effective management of biodiversity and thus its conservation depends on knowledge of the habitats and their condition; on knowledge of the species and their distribution, population sizes and dynamics, habitat needs, and individual threats; on identification of the critical species in the ecosystems, which may include only the rare or most economically valuable species; and on numerous other factors. However, such information is severely limited for the project site, which lies in a very poorly known region and hosts a very poorly known biodiversity (Toham et al., 2006). Furthermore, the information that is available is strongly biased toward a few vertebrate species, and is incomplete even for these (Scholes et al., 2006). Thus, the lack of adequate information to support effective management of the project site also represents a potential threat to conservation of its biodiversity.

G1.8. High Conservation Values Within the Project Zone

[Evaluate] whether the project zone includes ... High Conservation Values (HCVs) and [describe] the qualifying attributes.

G1.8.1 Globally, Regionally, or Nationally Significant Concentrations of Biodiversity Values

The majority of tropical organisms have not been evaluated for their conservation status, so until the individual species can be studied, habitat and landscape preservation are currently used to protect them in regions that have been identified as having many poorly known species of high conservation priority. This principle was first established by Myers et al. (2000), who presented a preliminary list of priority sites based on the existing biodiversity data combined with an assessment of human pressure, and this principle is now applied generally to areas with high biodiversity that are poorly known scientifically and under threat from human pressure.

A multinational, multiorganizational expert group studying the Congo Basin for current biodiversity and conservation status designated the Mai Ndombe project zone as a high priority area for conservation among terrestrial habitats in the Congo Basin (Toham et al., 2006; rated #2 of four priority levels, with #4 being the lowest). This terrestrial designation was based on assessments of the project area as having high biological distinctiveness, high ecological integrity, and a high threat level. However, the same multinational conservation assessment panel, surveying the entire Congo Basin, designated the level of ecological and biodiversity knowledge of the Mai Ndombe site as low within the region (Toham et al.,

2006; #4 of four categories, with #4 being the lowest). The project site is significant within the African continent for its high biodiversity (Scholes et al., 2006), and thus is a conservation priority even though its species diversity is not yet known (Diamond, 1986). See the project document "Mai Ndombe Site Conservation Value" for further details.

To supplement the currently low level of information available for the Mai Ndombe area, in 2011 ERA Ecosystems Restoration Associates contracted specialists from the Missouri Botanical Garden (MBG) to conduct preliminary inventories of plant, mammal, and bird species in the project area. These efforts represent significant investment to date in furthering the current knowledge of existing biodiversity values in the project area; however, as noted above, the level of biodiversity knowledge for the Mai Ndombe area is still low. The following biodiversity HCV criteria have been addressed using the most current knowledge available. It is likely that, as biodiversity knowledge increases for the area, additional information will become available related to the definition of HCVs.

a. Protected areas
There are no legally protected areas within the project zone.

b. Threatened species
Analysis of quantitative data from the initial plant inventory, consisting of 4 transect plots each of 0.1 ha area for plants greater than or equal to 2.5 cm dbh, plus associated subplots for understory and ground cover plants, revealed the presence of 7 species listed on the IUCN *Red List of Threatened Species* (www.iucnredlist.org) in threat categories of endangered (EN) or vulnerable (VU) based on global threat assessments (Missouri Botanical Gardens, 2012). Those species are:

(i) Endangered (EN)

- *Diospyros crassiflora Hiern*: family Ebenaceae
- *Millettia laurentii De Wild*.: Fabaceae

(ii) Vulnerable (VU)

- *Entandrophragma angolense* (Welw. ex C.DC.) C.DC.: Meliaceae
- *Entandrophragma utile* (Dawe & Sprague) Sprague: Meliaceae
- *Guarea cedrata* (A. Chev.) Pellegr.: Meliaceae
- *Guarea thompsonii* Sprague & Hutch.: Meliaceae
- *Lovoa trichilioides* Harms: Meliaceae

Threatened species were found in non-inundated (terra firma) forest, in approximately equal concentrations in both unlogged and selectively logged plots.

Several key animal species of high conservation value (HCV) are known in the region. These include bonobos (*Pan paniscus*), which inhabit forests; forest elephants (*Loxodonta africana cyclotis*), which inhabit forests; lions (*Panthera leo*), which inhabit the relictual grasslands in the region; and hippopotamus (*Hippopotamus amphibius*) and slender-snouted crocodiles (*Crocodylis cataphractus*), which inhabit lakes and rivers in the region. The project site is potentially within the range of all of these animals.

Several animal species of high conservation concern were detected in the rapid animal assessment surveys. These are *Manis giantea*, the giant pangolin, which is globally near-threatened, and *Pan paniscus*, the bonobo, a giant ape that is globally endangered and also is regionally restricted or endemic. The mammal fauna of the project site is, in fact, notable for the presence of *Pan paniscus*, and these animals are reported by local informants to be present and not particularly rare. Both animal sign and individual animals were observed in two different transects in the Bosongo sector during the short study time of the rapid assessment surveys. Bonobos were also anecdotally reported from the project site in the survey of hunting activities. These animals inhabit primarily the terra firma forest, but with ranges located along the edges of the floodplain forest, presumably to take advantage of food sources in both habitats (Inogwabini & Matungila, 2009). Thus, for conservation of these animals, the habitat mosaic of well-preserved upland forest interdigitated by swamp forest forms the critical habitat.

One bird species of high conservation concern was detected in these surveys, *Bycanistes cylindricus*, the brown-cheeked hornbill, which is globally near-threatened. Two individuals were observed, one in each of the two sectors surveyed, both in unlogged upland forest. Another near-threatened species, *Psittacus erithacus* (African grey parrot) also occurs in the site, but surprisingly was not recorded. This species is known to be one of the most popular avian pets and the animals are wild-collected for sale, so this species is facing high commercial demand in the region.

Another species of significant conservation concern that occurs in the project region is *Osteolaemus osborni*, Osborn's dwarf crocodile, the third and little-known species of this group of animals. These animals were formerly included in the species *Osteolaemus tetraspis*, which is globally vulnerable and is controlled with relation to trade by CITES, where it is listed in Appendix I (i.e., the most threatened organisms on Earth). Recent study of these animals shows that there are three genetically distinct populations that probably deserve recognition as three separate species, and consensus is building that the *Osteolaemus osborni* species or population is globally threatened (Eaton, 2010). These dwarf crocodiles are a popular pet worldwide and are in demand, and the animals are extensively wild-collected. Hunting of this species has been documented further north, with resulting high risk of local extinction through overexploitation (Felin & Inogwabini, 2008). The dwarf crocodile is particularly vulnerable within the extensive commercialization of African wildlife because it is one of the few species that can be transported live over long distances without the need for refrigeration (Thorbjarnarson & Eaton, 2004). This species is also very vulnerable to habitat reduction and degradation. Detection of the presence of this species is difficult, and requires specific knowledge of its biology and signs in forest surveys, and it is often not easily found even when known to be present (C. Ewango, personal observation).

Thus, from an animal conservation perspective, it is clear that the forests of the Mai Ndombe concession are of great significance and interest and deserve further investigation, particularly with study extending to other taxonomic groups and looking at the parts of the forest that were not surveyed during this assessment. Both mammal and bird species found in this survey indicate that the forest is very valuable for conservation and that it deserves some form of protection.

Based on this information, threatened species are considered to be high conservation values within both inundated and non-inundated forests in the project zone.

c. Endemic species

Endemic plant species (and subspecies) are here defined as those that are restricted in distribution to the Congo Basin and adjacent areas to the south and southwest (Forestier Central, Bas Congo, and Kasai of the standard regional flora, *Flore d'Afrique Centrale*). Analysis of data from the initial plant inventory revealed the presence of five endemic species and one endemic subspecies:

- *Artabotrys palustris* Louis ex Boutique: Annonaceae
- *Garcinia lujae* De Wild.: Clusiaceae
- *Baphia laurentii* De Wild.: Fabaceae
- *Cynometra sessiliflora* Harms: Fabaceae
- *Pterocarpus officinalis* Jacq. subsp. gilletii (De Wild.) Rojo: Fabaceae
- *Scaphopetalum vanderystii* R. Germ.: Malvaceae

Endemic species (and subspecies) were found in both non-inundated and seasonally inundated forest types, but with higher concentrations in the former (three species and one subspecies) than in the latter (two species).

Based on this information, these species constitute HCVs in both non-inundated and seasonally inundated forest types. Roy Gereau, who is a member of the IUCN Species Survival Commission's East African Plant Red List Authority, will recommend these five species and one subspecies to the Central African Red List Authority as good candidates for IUCN Red List assessment due to their restricted range and apparent rarity.

To date there have been no endemic mammal or bird species observed in the project area or zone. These species tend to be more widespread with less tendency toward endemism in the Congo Basin.

d. Areas that support significant concentrations of a species during any time in their life cycle (e.g., migrations, feeding grounds, breeding areas)

As stated above, the currently available information for this region is limited. However, personal communications with Dr. Charlotte Taylor, who is Curator of the Missouri Botanical Garden and involved with the 2011/2012 biodiversity studies conducted for the project, indicate that areas within the project zone likely to support significant populations of various species include the lakeshore in the very margin of the vegetation, and the forested swamps and streams that extend into the main project area. There is limited to no information available about fish in the lake, but without doubt a number of species obligately breed in shoreline areas and in the lakeside swamps. As well, a number of populations of water birds such as herons and kingfishers no doubt depend on this section of the project area as breeding areas. Water-oriented raptors such as kites and fish eagles depend on this area for breeding and feeding, as do African water snakes.

In the main project area, the long, narrow areas of unlogged upland forest and adjacent swamp forest support significant numbers of the bonobo during its life cycle. As bonobo live in small groups, these populations may well constitute what could be considered significant concentrations.

Given the absence of known information about the area, the presence of this HCV is difficult to confirm with certainty. Based on what is known, however, it is reasonable and conservative to assume that lakeshore zones, the forested swamps and streams that extend into the main project area, and unlogged upland forest and swamp forest transitional zones support significant concentrations of various species during parts of their life cycle and therefore are high conservation values.

G1.8.2 Globally, Regionally, or Nationally Significant Large Landscape-Level Areas Where Viable Populations of Most, If Not All, Naturally Occurring Species Exist in Natural Patterns of Distribution and Abundance

The project site and zone form part of an area that has been formally identified as a globally significant landscape-level area: the Lac Télé–Lac Tumba Landscape (Felin & Inogwabini, 2008). It was selected by

an international working group that surveyed all of Central Africa for regions that have a significant area of natural populations (i.e., species that occur in natural patterns of distribution and abundance), in which the areas of natural populations are linked together by good migration corridors (Kampden et al., 2006). This working group drew the outlines of the areas with good natural populations, and the project area falls directly inside this particular landscape. The panel carefully examined the region and concluded that the project area is an important component of this landscape, both for natural populations and for its key location. Thus this landscape will suffer significant degradation without the preservation of the project area. The project area is near the edge of this overall landscape; this means that the project is especially critical for conservation of the entire landscape because the key to protecting an area is to protect the outside or edge areas in particular. The edges are where environmental degradation enters the area, and from where it spreads to the interior. It is uncommon for environmental degradation to start in the middle of an undeveloped area, but once the edges are burned or degraded, the interior part is under direct threat.

Another working study group made the same landscape evaluation for freshwater ecosystems in central Africa, and they identified Lake Mai Ndombe as a well-preserved freshwater area with good natural populations that is critical for conservation in the region (Toham et al., 2006). One of the main reasons Lake Mai Ndombe qualifies as a significant landscape element is because of the large amount of good natural vegetation and populations along its western shore. This is the project area, which is thus a critical part of this important landscape element.

With respect to plant species, the project zone, with a surface area of >300,000 ha, is a regionally and nationally significant large landscape-level area with a large number of naturally occurring species, many of which are documented by the field plot data. To address the questions of whether these populations are viable, that is, whether they are capable of surviving within the project zone in the absence of genetic contact with outside populations, and whether they occur in natural patterns of distribution and abundance, wider sampling would have to establish the real patterns of distribution and abundance of those species, then compare these patterns with patterns derived from similar sampling in comparable natural forest vegetation elsewhere. Sources of comparative data for other forests in the Congo Basin include Alstatt et al. (2008), Eba'a Atyi and Bayol (2008), Ewango et al. (in prep.), Felin and Inogwabini (2008), Toham et al. (2006), World Wildlife Fund (2010a, 2010b), and unpublished data from forest sampling in Salonga National Park by the Wildlife Conservation Society (C.E.N. Ewango, personal communication).

The species composition of the larger trees occurring in unlogged terra firma forest in the initial plant inventory is relatively congruent with that of the circular forestry plots previously censused, and although those two datasets are not statistically comparable, this suggests a relative homogeneity of species composition in this forest type throughout the extensive project zone and a corresponding high probability that populations of many of these species are viable.

The information presented above is not enough to confirm with certainty that unlogged primary terra firma forest in the project zone supports viable populations of most or all naturally occurring species in natural patterns of distribution and abundance. However, this is a realistic possibility due to the large size of the project zone and the likelihood of relatively homogeneous species composition (for plants), and given that the project zone has been formally identified as an important component of a globally significant landscape-level area in which natural populations are linked together by good migration corridors, we may conservatively assume that that unlogged primary terra firma forest in the project zone fulfills this CCB criterion and thus constitutes a high conservation value for the project.

G1.8.3 Threatened or Rare Ecosystems

The major ecosystems in the project zone are terra firma forest, both logged and unlogged; seasonally inundated forest; permanently inundated forest; and savanna, both anthropogenic and natural. Although none of those ecosystems is particularly rare in the central to western Congo Basin, it is clear that terra firma forests with high concentrations of valuable timber trees are increasingly under threat where not protected from unsustainable logging. We have documented the presence of a large number of commercially exploited tree species within the terra firma forest parts of the project zone, including all seven threatened species listed above, which supports the consideration of terra firma forest in the project zone as a threatened ecosystem. Terra firma forest is therefore considered to be a high conservation value for the purposes of the project plan.

Wetlands are of very high conservation concern in the 21st century because they are of vital importance for the functioning of natural ecosystems, because they provide essential ecosystem services for human populations; and because they are under particular threat from human exploitation and are subject to rapid degradation with very slow recovery. Wetlands are sometimes thought of only as lakes, but biologically include rivers, marshes, permanent swamps, seasonal swamps, and the ecotone along the lake and marsh shore. Protection and conservation of key wetlands is addressed by the Ramsar Convention, an international group that regularly convenes a multinational expert group to identify wetlands of the highest conservation priority worldwide. The project area and zone are part of one of these wetlands of international importance, the Ngiri-Tumba-Maindombe Wetland, with about half of the project area comprising swamp habitats that are interconnected with the lake ecosystem (Ramsar Convention on Wetlands, 2012). Ngiri-Tumba Maindombe is the largest wetland of international importance in the world as recognized by the Ramsar Convention and is the largest freshwater area in the African continent. Swamp forests of the project zone are considered to be a high conservation value under this category.

G1.8.4 Areas that Provide Basic Ecosystem Services in Critical Situations (e.g., watershed protection, erosion control)

Forests critical to water catchments

Lake Mai Ndombe has been designated as a freshwater area of highest priority for conservation among freshwater areas in the Congo Basin (Toham et al. 2006, rated #1 of four priority levels, with #4 being the lowest). This freshwater designation is based on assessments of high biological distinctiveness and high ecological integrity. The project site borders Lake Mai Ndombe and is intimately connected ecologically with it; that is, the ecological health of the project site is essential for the continued health of the lake and vice versa (Missouri Botanical Garden report for the Mai Ndombe project, 2012). See also the above description of the Tumba-Ngiri-Maindombe wetland. Due to the role that forests in the project zone play in protecting these internationally recognized lake and wetland values, this ecosystem service is considered a high conservation value.

Forests critical to erosion control

While forests of the project zone do play a role in erosion control, slopes are generally less than 5% and therefore do not present a significant erosion risk. Erosion control is not a high conservation value for the project.

Forests providing barriers to destructive fire

HCV network guidance indicates that HCVs for this criterion would be “those few forests that provide natural barriers to fire where uncontrolled spread of fire could pose a serious risk to human life and property, economic activity, or to threatened ecosystems or species” (HCV Tool Kit, Part 3). The

seasonally inundated forests, perennial lakes, and intact primary rainforest in the project zone do provide barriers to forest fire. While large-scale fire has not traditionally been a significant factor in the Congo Basin, uncontrolled spread of fire in tropical forests is aggravated by drying microclimate and by increased human access via roads and trails in selectively logged tropical forests (Nepstad et al., 1999). In addition, increased agricultural activity and a shift from patchy small-scale to uniform large-scale management over the last 50 to 100 years are increasing tropical forest fire frequency and severity in Africa (Colombaroli & Verschuren, 2010).

The project area experienced an exceptionally dry year in 2011 that led to areas being burnt in the southeastern part of the concession. These events are comparable to the Brazilian Amazon-like burn events described by Cochrane in numerous studies (Cochrane & Schulze, 1998, 1999; Cochrane & Laurance, 2008). Forest fire from neighbouring savannas outside the project area spread out inside the concession after crossing a dried-out swamp forest. This fire burned nearly 2700 hectares of forest during that season. Such droughts have been extremely rare in the past; however, this may change due to factors noted above.

Based on these considerations, while barriers to destructive fire may not have been of critical importance for the project zone in the past, they may be so in the future, if not already. They will be considered a high conservation value for the project.

G1.8.5 Areas that are Fundamental to Meeting Communities' Basic Needs (e.g., for essential food, fuel, fodder, medicines, or building materials without readily available alternatives)

Both Bantu and Pygmy groups in the project zone rely on the forest for various aspects of their livelihoods. Fish whose habitat requirements depend largely on the health of forest riparian-supported spawning areas form a significant portion of the local diet. A less-significant in terms of quantity, but nonetheless important source of sustenance comes from non-timber forest products, including insects, grub worms, caterpillars, and honey. Shifting cultivation practices also depend on the presence of sufficient area of intact forest as a source of fertile soil. Saps, leaves, and other tree components are a source of medicinal ingredients, most significantly for Pygmy communities. Forests are the primary supply of wood for cooking, while vines and poles constitute important raw materials for building and crafts. Drinking water comes largely from wells, for which forests play a role in the regulation of ground water supply.

An important factor to consider when determining whether the above values constitute HCVs is whether they can be replaced by readily available alternatives. That is, are these resources supplied by forests in the project zone replaceable or irreplaceable? History in the area has shown that as forest is degraded to savanna-like conditions, people are able to adapt by finding alternative types of resources. What is unlikely, though, is that as forest conditions erode, the same products and values previously obtained from intact forests would be available to the same extent through other means, such as migration to new areas of intact forest. In this sense then, the above basic needs currently obtained from the forests by local communities are not replaceable. As well, a scenario of degraded or non-existent forest would leave communities with a significant reduction in the diversity of livelihood sources, leaving them more vulnerable to future disturbances and change. For these reasons, forest areas important to supplying the above-noted resources are considered to be high conservation values.

G1.8.6 Areas that are Critical to the Traditional Cultural Identity of Communities (e.g., areas of cultural, ecological, economic, or religious significance identified in cooperation with the communities)

Important sacred sites exist within the project zone's forests. These include burial and spiritual sites. To protect the secrecy of these sites, their specific locations have not been divulged by local chiefs. Traditional tribal forms of governance apply alongside more contemporary forms throughout the project zone. As well, non-timber forest products are frequently used for artistic and traditional purposes, including construction of canoes, drums, and masks. Local worldview and creation stories are strongly related to the landscape. Together these values are critical to the traditional cultural identity of local communities and form a high conservation value for the project zone.

G2. Baseline Projections

G2.1. Most Likely Land-Use Scenario in the Absence of the Project

Describe the most likely land-use scenario in the absence of the project following IPCC 2006 GL for AFOLU or a more robust and detailed methodology, describing the range of potential land-use scenarios and the associated drivers of GHG emissions and justifying why the land-use scenario selected is most likely.

The VCS Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry, and Other Land Use (AFOLU) Project Activities, Version 3.0 Feb 2012, has been used to assist with determination of the most likely land-use scenario in the project area and to demonstrate additionality for the Mai Ndombe REDD project. This tool involves four steps. Step 1, identification of alternative land-use scenarios, is addressed here in section G2.1. Completion of the subsequent steps is described in section G2.2, with respect to additionality.

VCS Tool, Step 1: Identification of alternative land-use scenarios to the AFOLU project activity.
Substep 1a: Identify credible alternative land-use scenarios to the proposed VCS AFOLU project activity.

a.

i. *Continuation of the preproject land use*: Continuation and proliferation of logging activities which had begun under the terms of the logging concession: In this scenario a cascade of degradation initiated by planned commercial harvest. The logging concession, which applies to the entire project area and was acquired by the project proponent, would have authorized harvest of 5000–6000 hectares per year in this scenario, encompassing most of the primary terra firma forested area over the 25-year period of the logging concession (2011 to 2036). The initial selective harvest of merchantable trees would employ new roads and bridges that would serve to significantly increase access to the project area. As a result, agents of deforestation would have much greater access to the project area in search of wood for building materials and charcoal production and for preparing land for agricultural production. (This secondary deforestation would occur as characterized by the 'unplanned' baseline types described in the VM0009 methodology version 2.0.) The end-state land cover in this land-use scenario is characterized by nearly complete deforestation.

ii. *Community subsistence forest use*: Communities within the project boundary have customary use rights to the forest. These include such activities as small-scale charcoal production, small-scale harvest for local timber use, and slash and burn agricultural conversion, as was being conducted prior to the award of the logging concession to BIMPE AGRO in 2003.

iii. *Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project*: Although unlikely, the DRC government and/or local NGOs could conduct conservation activities similar to the proposed project activities in the project area in the absence of carbon revenues.

iv. *If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:*
   - *Legal requirements; or*
   - *Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.*

This is not applicable as there are no legal requirements for forest protection in the project area and there are no similar activities occurring in the surrounding geographical region. There have been no such requirements or activities within 10 years prior to the project start date.

b. *All identified land use scenarios must be credible. All land uses within the boundary of the proposed VCS AFOLU project that are currently existing or that existed at some time in the period beginning ten years prior to the project start date but no longer exist, may be deemed realistic and credible. For all other land-use scenarios, credibility shall be justified. The justification shall include elements of spatial planning information (if applicable) or legal requirements, and may include assessment of economic feasibility of the proposed land-use scenario*.

The identified land-use scenario listed in Substep 1a.a.i represents the land use within the boundary of the proposed VCS AFOLU project prior to the with-project scenario, and therefore is deemed realistic and credible.

The identified land-use scenario listed in Substep 1a.a.ii represents the land use within the boundary of the proposed VCS AFOLU project prior to the commercial logging concession, but within 10 years of the project start date, and is therefore deemed realistic and credible.

The identified land-use scenario listed in Substep 1a.a.iii represents a highly unlikely hypothetical scenario that is deemed unrealistic and not credible due to lack of financial resources available to the government of DRC and local NGOs.

c. *Outcome of Substep 1a***:** There are two credible alternative land-uses that could have occurred on the land within the project boundary:

- The continuation of preproject land-use activity, which is commercial logging, as described in Step 1a.a.i above.
- The continuation of precommercial logging land use, as described in Step 1a.a.ii above.

Substep 1b: Consistency of credible land-use scenarios with enforced mandatory applicable laws and regulations.

i. Demonstrate that all land-use scenarios identified in substep 1a are in compliance with all mandatory applicable legal and regulatory requirements.

Both identified alternative land uses listed in substep 1a are in compliance with all mandatory applicable legal and regulatory requirements in the DRC.

ii. If an alternative does not comply with all mandatory applicable legislation and regulations then show that, based on an examination of current practice in the region in which the mandatory law or regulation applies, those applicable mandatory legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread, that is, prevalent on at least 30% of the area of the smallest administrative unit that encompasses the project area.

N/A

iii. Remove from the land-use scenarios identified in substep 1a any land-use scenarios which are not in compliance with applicable mandatory laws and regulations, unless it can be shown these land-use scenarios result from systematic lack of enforcement of applicable laws and regulations.

N/A

Outcome of Substep 1b: There are two credible alternative land uses that could have occurred on the land within the project boundary and that are in compliance with applicable mandatory laws and regulations:

- The continuation of preproject land-use activity, which is commercial logging, as described in Step 1a.a.i above.
- The continuation of precommercial logging land use as described in Step 1a.a.ii above.

Substep 1c: Selection of the baseline scenario.
The methodology VM0009 'Methodology for Avoided Deforestation' provides a step-wise approach for selecting the most plausible baseline scenario. For this project, the most plausible scenario was determined to be the continuation of preproject land-use activity, which is commercial logging, as described in Step 1a.a.i above.

G2.2. Additionality

Document that project benefits would not have occurred in the absence of the project, explaining how existing laws or regulations would likely affect land use and justifying that the benefits being claimed by the project are truly 'additional' and would be unlikely to occur without the project.

VCS Tool Step 2: Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land-use scenarios.

Substep 2a. Determine appropriate analysis method: The VCS AFOLU project generates no financial or economic benefits other than VCS-related income, so simple cost analysis applies.

Substep 2b. Apply simple cost analysis: The investment analysis (simple cost analysis – option 1 in the VCS Tool) demonstrated that the project produces no substantial benefits for project proponents other than VCS-related revenue. Although limited revenue is expected from some project activities (e.g., wood energy plantations, various agricultural improvement projects), this revenue is expected to be very small in comparison to project implementation costs and VCS-related revenue. Even though some project activities will generate revenue for local community members, they do not represent viable stand-alone sources of revenue and would not be initiated in the absence of VCS-related revenues.

Further, the NPV of logging activities in the baseline scenario are far greater than the NPV of project activities, reinforcing that it is unlikely that project activities would have occurred in the absence of VCS-related revenue.

The investment analysis demonstrated that the scenario with the greatest financial returns would be the granting of a logging concession to a timber company for commercial harvest.

VCS Tool Step 3: Barriers analysis.
This step is not required since we have analyzed the investment returns on the project site.

VCS Tool Step 4: Common practice analysis.
There are no activities similar to the activities proposed by this project that are underway in the geographic area of the project. Few efforts have been made in the area to develop ecologically sustainable livelihood alternatives or to improve the management of forests and other common-pool resources. As a result, the area is characterized by low living standards, little infrastructure, and a continued reliance on forest-clearing for subsistence agriculture.

Therefore, the proposed VCS AFOLU project activity is deemed not to be the baseline scenario; hence it is additional.

Land-use laws that could impact carbon stocks are summarized in sections G1.6 and G5.1.

G2.3. Estimated Carbon Stock Changes in the Without-Project Scenario

Calculate the estimated carbon stock changes associated with the without-project scenario.

Definition of Carbon Pools

Carbon dioxide (CO_2) was determined to be the primary source of greenhouse gas emissions in the project, given the threat of deforestation from both sanctioned commercial harvest and illegal logging in the baseline scenario. Methane (CH_4) and nitrous oxide (N_2O) are conservatively excluded from the project.

Table G2.1 Applicable emissions.

Pool	Sources	Inclusion	Justification
CO_2 (carbon dioxide)	Flux in carbon pools	Yes	Major pool considered in the project scenario
CH_4 (methane)	Burning of biomass	No	Conservatively excluded
N_2O (nitrous oxide)	Burning of biomass	No	Conservatively excluded

Details about the treatment of each pool as defined in VM0009 are as follows:

Above-ground merchantable trees (AGMT): AGMT are assumed to be removed and converted to long-lived wood products by commercial logging agents. Residual AGMT biomass remaining in the baseline scenario is limited to those merchantable trees which are below the minimum diameters specified in the logging concession and which are conservatively assumed to remain standing after the logging event. The project proponent's inventory analysis indicates that the residual AGMT biomass is equivalent to **1.52 tCO2e/ha** in the baseline scenario.

Above-ground non-merchantable trees (AGOT): AGOT are assumed to be removed, burned, or converted to fuel wood in the baseline scenario. Residual AGOT biomass remaining after agents have acted upon the forest was determined using data collected from plot measurements in the proxy area. The proxy area sampling indicates that **65.56 tCO2e/ha** remains in AGOT after a deforestation event.

Below-ground merchantable trees (BGMT): BGMT are assumed to be impacted only slightly by commercial agents. Following completion of commercial activity, below-ground biomass is

conservatively assumed to decay over time. The below-ground portion of residual biomass for merchantable trees in the baseline scenario was determined using a ratio of 0.37 (the IPCC default root-to-shoot ratio for wet tropical forests) of residual above-ground biomass.

Below-ground non-merchantable trees (BGOT): The below-ground portion of residual biomass for non-merchantable trees in the baseline scenario was determined using a ratio of 0.37 (the IPCC default root-to-shoot ratio for wet tropical forests) of residual above-ground biomass.

Soil organic carbon (SOC): SOC is assumed to deplete to **56.99 tCO2e/ha**, the SOC levels measured in the proxy area. The depletion of SOC stocks occurs according to the decay function, which employed the default value (0.2) for the λ term.

Wood products (WP): The calculation of biomass remaining in WP is based on the amount of AGMT harvested over time and employs the most conservative parameters as prescribed in Appendix C of the VM0009 methodology. All harvest wood is assumed to be used for sawnwood. Using a milling wood waste fraction (w) of 0.24 for developing countries, a long-lived wood fraction (l_{ty}) of 0.8 and an oxidation fraction (f_{ty}) of 0.1, the amount of tCO_2e sequestered in WP after 100 years is estimated to be **668,092 tCO_2e** (Winjum et al., 1998).

Table G2.2 Carbon pools included in the project area.

Pool	Required	Included in Project?	Justification
Above-ground merchantable tree	Required	Yes	Major pool considered
Above-ground non-merchantable tree	Required	Yes	Major pool considered
Above-ground non-tree	Optional	No	Conservatively excluded
Below-ground merchantable tree	Optional	Yes	Major pool considered
Below-ground non-merchantable tree	Optional	Yes	Major pool considered
Below-ground non-tree	Optional	No	Conservatively excluded
Litter	No	No	Conservatively excluded
Dead wood	Optional	No	Conservatively excluded
Standing deadwood	Optional	No	Conservatively excluded
Lying deadwood	Optional	No	Conservatively excluded
Soil organic carbon	Optional	Yes	Major pool considered
Wood products	Required	Yes	Major pool considered

Carbon Stocks

Table G2.3 provides a summary of carbon stock changes in the without-project baseline scenario.

Table G2.3 Projection of avoided baseline emissions over the project lifetime.

Monitoring period	Date	Estimated baseline emissions or removals (tCO_2e)
1	10/31/12	3,398,286
2	10/31/13	2,819,006
3	10/31/14	3,529,795
4	10/31/15	4,330,794
5	10/31/16	5,279,073
6	10/31/17	6,273,185
7	10/31/18	7,429,948
8	10/31/19	8,524,210
9	10/31/20	9,642,568
10	10/31/21	10,724,028
11	10/31/22	11,486,467
12	10/31/23	12,156,738
13	10/31/24	12,377,577
14	10/31/25	12,683,678
15	10/31/26	13,011,345
16	10/31/27	11,833,474
17	10/31/28	11,439,490
18	10/31/29	10,448,018
19	10/31/30	10,047,330
20	10/31/31	9,413,412
21	10/31/32	7,067,767
22	10/31/33	7,093,658
23	10/31/34	7,062,984
24	10/31/35	5,577,002
25	10/31/36	3,839,613
26	10/31/37	3,567,731
27	10/31/38	3,341,502
28	10/31/39	3,101,996
29	10/31/40	2,978,211
30	10/31/41	443,874
	Total	**220,922,762**

Analysis of Relevant Drivers and Rates of Deforestation

The agents of deforestation in the reference area are twofold:

- **Primary agents:** Commercial logging companies, including primarily SOFORMA (Société forestière u Mayombe). Primary agent mobility is assumed to be 500–3000 km, due to mechanized transport and a vast infrastructure system, as well as the capacity to harness natural infrastructure systems (rivers).
- **Secondary agents:** Local villagers who convert heavily degraded forest into agriculture for subsistence and market sale. Mobility of the secondary agents is typically limited to that which can be traveled on foot or by crude means of transport (~5–25 km) except in the case where trucks or boats are used to transport cash crops to market (~100–500 km)

Drivers of deforestation:

a. Ease of transport/travel (infrastructure)
b. Proximity to major river
c. Proximity to major market
d. Access to deforestation tools

The primary agents of deforestation in the Mayombe Forest area, within the Bas Congo district (the reference area), are identical to the primary agent in the project area (Mai Ndombe). They are the commercial logging conglomerate SOFORMA. This company is a legally operating timber company that has been operating in the Mayombe Forest since the beginning of the reference period and beyond.

Interviews in the reference area indicate that SOFORMA has created and maintained the vast majority of infrastructure (roads and bridges) to support logging operations. The Mayombe Forest has been systematically logged throughout the reference period to the extent that only tiny forest remnants remain. These same interviews saw elders recounting stories of vast dense forest some 10–20 years ago. A visual and subjective estimate shows that greater than 90% of the Mayombe area has been denuded, and the main cause of this, as corroborated by local chiefs and villagers alike, is commercial logging. Primary agent range is, as expected, quite fluid and far reaching. Most commercial logging outfits host vehicle fleets and massive machinery capable of felling many hectares of forest in a matter of hours. Most of the timber was transported to the main hub, Kinshasa, which is the capital of the DRC, via waterway (the Congo River). SOFORMA has ceased most operations in the area due to scarcity of forest, but some mills remain active in small numbers sawing remnant forest. The Mayombe Forest is approximately equidistant from Kinshasa as the Mai Ndombe forest (approximately 275 km).

The drivers for the primary agents differ from those of the secondary agents. For primary agents, the main drivers are market based. The overwhelmingly prevalent spatial driver that can be identified is proximity to major waterway (thus allowing access to major markets). Additionally, forest density and number/type of hardwood species drive the agents to deforest in certain specific locales. Most other drivers can be artificially manipulated by the agents, including infrastructure (roads, bridges, electricity, etc.).

The secondary agents of deforestation are these same local people, who either resided in the area previously or moved there to work for the logging operation(s). These local people, practicing mostly subsistence farming, cite the increase in ease of access (due to logging) as the primary reason for converting the remaining land to agriculture. In fact, many interviewees claim that before SOFORMA built roads and provided access to the deep forest, it was virtually impenetrable. Acting out of necessity, these secondary agents have proceeded to denude most of the remaining heavily degraded forest in the

reference area to grow crops for their families and communities and also for market sale. Trucks carrying plantains, cassava, and maize are clearly visible travelling the market route between Boma–Matadi and Kinshasa at present day.

Drivers influencing the secondary agents include proximity to roads, fresh water, and major markets (which allows for healthcare, education, etc.) and, to a smaller extent, market-based drivers such as price fluctuations.

The rate of deforestation is calculated using modelling methods as defined in the VCS methodology VM0009.

G2.4. How the Without-Project Scenario Would Affect Project Zone Communities

Describe how the without-project scenario would affect communities in the project zone, including the impact of likely changes in water, soil, and other locally important ecosystem services.

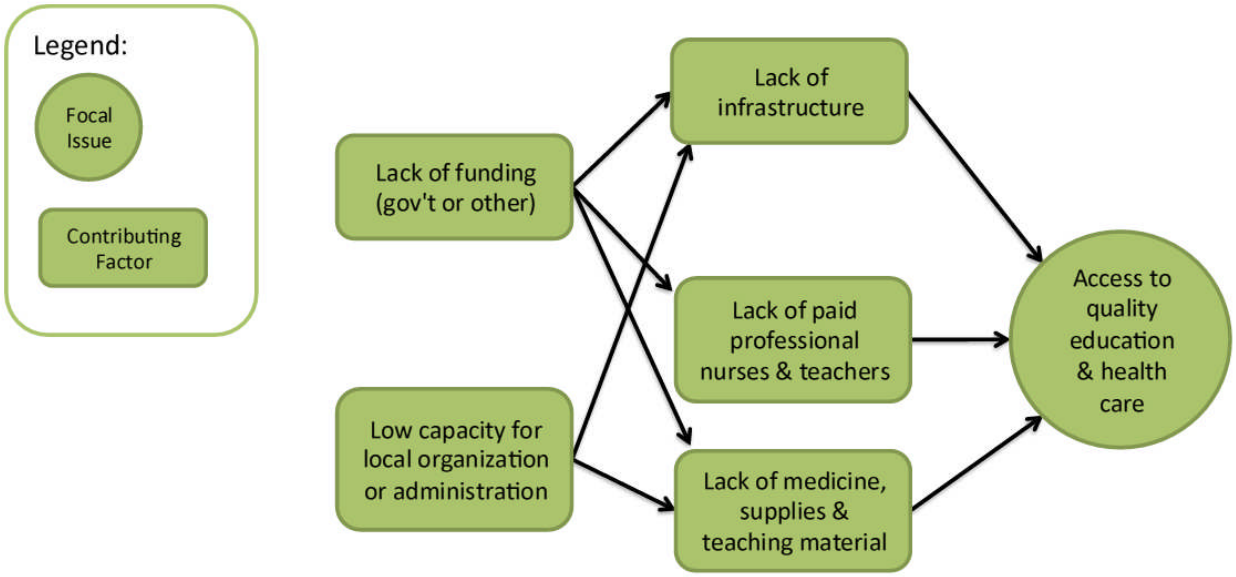
In the without-project (baseline) scenario, it is expected that the preexisting timber concession arrangement would continue. The former concession holder was actively applying for re-award of the concession (documentation submitted to the Mai Ndombe project validator), and it had full support of provincial authorities in Bandundu, as well as support within the Ministry itself (see section G2.2).

Extreme underdevelopment of the communities within the project area could be expected to continue with the continuation of timber harvesting. While the government is adopting new regulations regarding indigenous and rural land-user rights to forest resources (both timber and non-timber forest products), it currently lacks the capacity to monitor the sustainable exercise of these rights (see section G1.6).

Even though the former logging company was extracting highly valuable trees in the concession and therefore making substantial profit from this activity, the return for the community was insignificant at best. The previous logging concession holders paid 20 US cents per cubic metre to land chiefs, compared to the official average timber value of 450 US dollars per cubic metre. The market price is approximately double this amount. The company was employing less than 200 people and more than half of these were not from communities in the project area. Even by Congolese standards, most of these employees were paid below the minimum wage. No viable infrastructure was built during the five years SOFORMA logged the area previously, with the exception of three schools built with local materials and metal roofing sheets. A small clinic in Mpata Mbalu (the logging company's operation base) was built, but it has already become unusable four years after the company left. Socioeconomic impacts from the concession as managed for logging would be expected to continue as they have historically, that is, with the realization of very minimal beneficial effects.

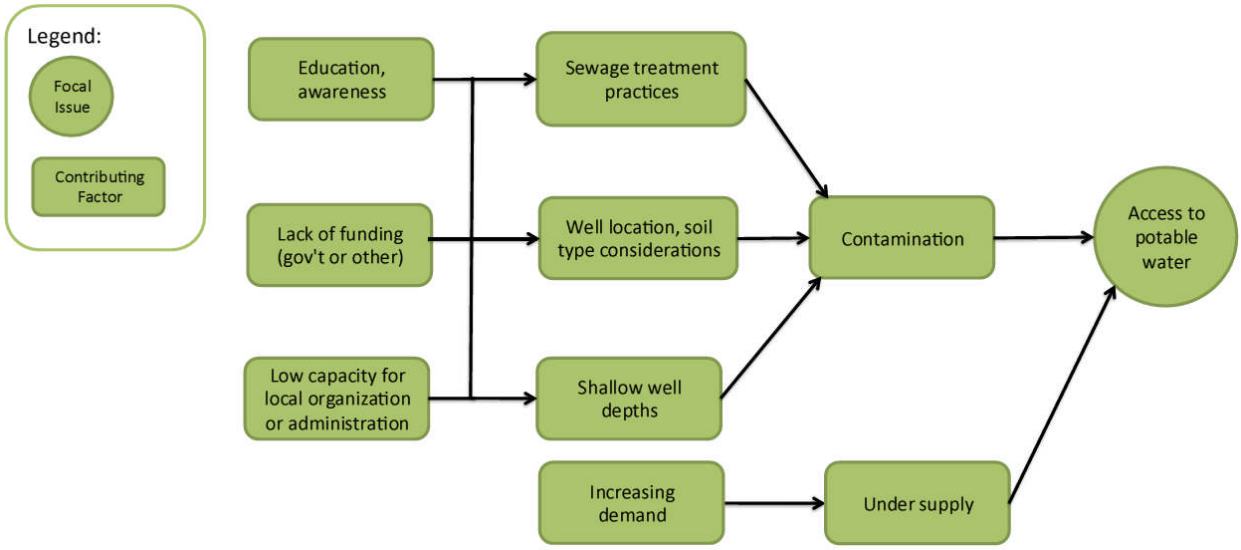
With respect to Community Focal Issue 1 (see section G1.5), without the project, an ongoing chronic lack of resources would keep education and healthcare infrastructure and delivery capacities at the presently very low level. Figure G2.2 depicts this scenario through the use of a problem flow diagram. Many villages have no or inadequate schools and healthcare centers and a continuing shortage of paid staff and supplies. Since the early 1990s, near the end of the Mobutu regime, there has been no significant state, NGO, and/or private sector investment in infrastructure for communities in the project area, and existing infrastructure is in a state of steady decline. There is no improvement on the horizon with regard to the reform of political and administrative institutions at all levels, and corruption is common in spite of many exemplary efforts on the part of individuals. This and the additional problem flow models further below will be reviewed and revised with participation from local communities on an ongoing basis throughout the life of the project.

Figure G2.2 Problem Flow Diagram for Access to Quality Education & Health Care



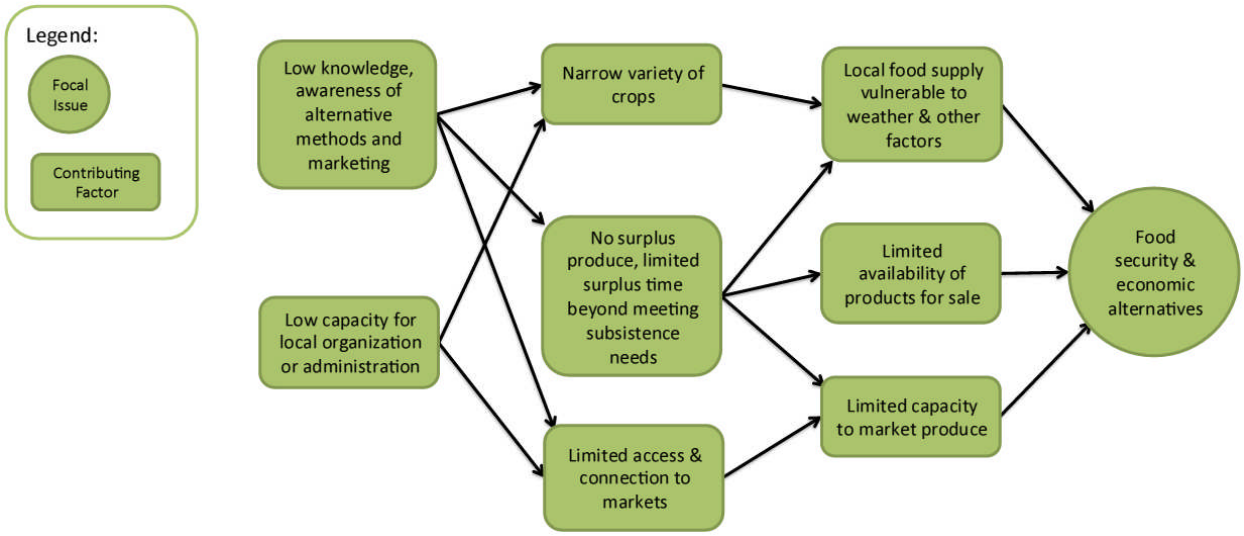
With respect to Community Focal Issue 2, access to clean drinking water is not expected to increase because there is no well digging equipment present in the Inongo territory or evidence of efforts to improve the current situation. Figure G2.3 depicts how a lack of education and awareness, combined with low capacity for local organization, contribute to an inability to improve sewage treatment practices, well location to avoid contamination, or the quality of existing wells. In addition, population levels are increasing at a rate of roughly 3% per annum, increasing the pressure on an already inadequate supply of potable water.

Figure G2.3 Problem Flow Diagram for Access to Potable Water



Community Focal Issue 3 (Figure G2.4) relates to food security and economic alternatives. A heavy reliance on one subsistence crop, cassava, which is mainly starch with very low levels of vitamins and protein, and declining fish stocks in the area often result in food shortages and a high level of malnutrition across all ages. Daily food intake levels are often below basic needs and the vast majority of families do not have food reserves. When surplus agriculture is produced, farmers have difficulty accessing viable markets. Without improvements to agricultural techniques and better access to markets, the current situation is expected to continue. Off-farm revenues from alternate economic activities are insufficient to purchase food or other essential items that cannot be produced at home. Individuals walk on average between 5 and 10 km to farming plots (Loyombo, 2012) and the trend is toward travelling even further as local populations grow. High levels of time and energy are spent bringing food, fuelwood, service-wood, and non-timber forest products (NTFP) back to the villages each day. During the previous logging concession operations, communities continued to rely on this set of inadequate circumstances with respect to food supply and economic alternatives, with no signs of planned interventions for improvement. It is therefore expected that the without-project scenario, that is, a continuation of timber-focused concessions, would result in the persistence of these inadequate and declining well-being conditions related to food security and economic alternatives.

Figure G2.4 Problem Flow Diagram for Food Security and Economic Alternatives



The above-mentioned stresses are exacerbated by an erosion of traditional governance and a lack of effective non-traditional governance systems currently in place. Traditional land chiefs have for the most part lost the historic sense of stewardship and inter-clan divisions are common place. This degradation of traditional governance is expected to continue. Prior to the 1990's there was solidarity and cooperation within and between clans in the same village. However at present, solidarity and cooperation is less common (Loyombo, 2012) and villagers are losing their ability to consult (palabres) effectively and work together to solve common problems.

In the baseline scenario, a major impediment to sustainable community development would be the above mentioned weaknesses in governance, and also a scarcity of community associations such as producer cooperatives, women and youth groups, and local national or international NGOs that can act as catalysts for social change and cooperative community development. At present, there are traces of NGO supported community groups but these are often empty frameworks with no operational capacity.

The notable exceptions are recently created associations of fishermen, networked and supported by a Belgium NGO, APEFE, and several cassava producer cooperatives in Lobeke (Loyombo, 2012). It is anticipated that degraded forest cover resulting from continued logging in the without-project scenario would foster the creation of a considerable number of new agricultural producer cooperatives (as new land is made available for agriculture). These types of cooperatives usually focus on the commercialization of produce for their members. Aside from increasing revenue for these specific households, however (an increase which may be temporary due to the unsustainable nature of current practices), there would not be a proportional increase[11] in social cohesion and resilience. With communities losing their ability to respond to crises collectively and individual households not having the resources to take care of basic needs, food insecurity and overall socioeconomic conditions will likely continue to deteriorate.

An existing road to Kinshasa is currently under improvement. Communities based along this road may benefit from these improvements (both in the without-project and with-project scenarios) as these communities would have increased access to outside markets and a potential for increase in traffic to their communities. However, systemic barriers to development, such as corruption, inadequate infrastructure, and low education rates and local capacity, will likely prevent a major improvement in socioeconomic well-being in this area.

In summary, it is anticipated that there would be an overall gradual decline in socioeconomic well-being in the without-project scenario. The above problem flow diagrams (Figures G2.2 to G2.4) and the focal issues described in section G1.5 illustrate the interconnectivity of contributing factors to the current baseline conditions and show that, in the without-project scenario, systemic issues such as lack of funding, low levels of community capacity, and low levels of education, the current socioeconomic conditions are likely to continue or worsen.

Land Use in the Without-Project Scenario

In the baseline scenario, 5000 to 6000 hectares would be logged per year, covering most of the primary terra firma forested area over the 25-year period of the logging concession (2011 to 2036). In the DRC, logging companies have consistently ignored most selective logging regulations and in most cutblocks, the vast majority of merchantable stems greater than 40 cm in diameter at breast height have been harvested and/or cut down. Once logging companies extract the merchantable timber, access for entry by other external agents[12] is facilitated, and locals continue the unplanned and illegal extraction of logs, lumber, fuelwood, and charcoal.

Baseline legal and subsequently illegal logging such as this would have continued to expand throughout most of the southern part of the concession and eventually into the northern part. The extensive logging road network would have been connected to a major provincial highway[13] that would open up road access to Kinshasa for external agents and most of the local communities within the southern and northern parts of the concession. Given the growing Kinshasa and DRC-wide market for agricultural

[11] At present, average household revenue is below $150 per year. A major Ministry of Agriculture household survey in Bandandu province showed that average revenues of households selling fish and cassava are more than double that of those who are mainly subsistence based. This higher yearly amount is still not a living-wage scenario given that prices of schooling, healthcare, and other basic amenities have increased substantially due to inflationary pressures driven by urban economies.

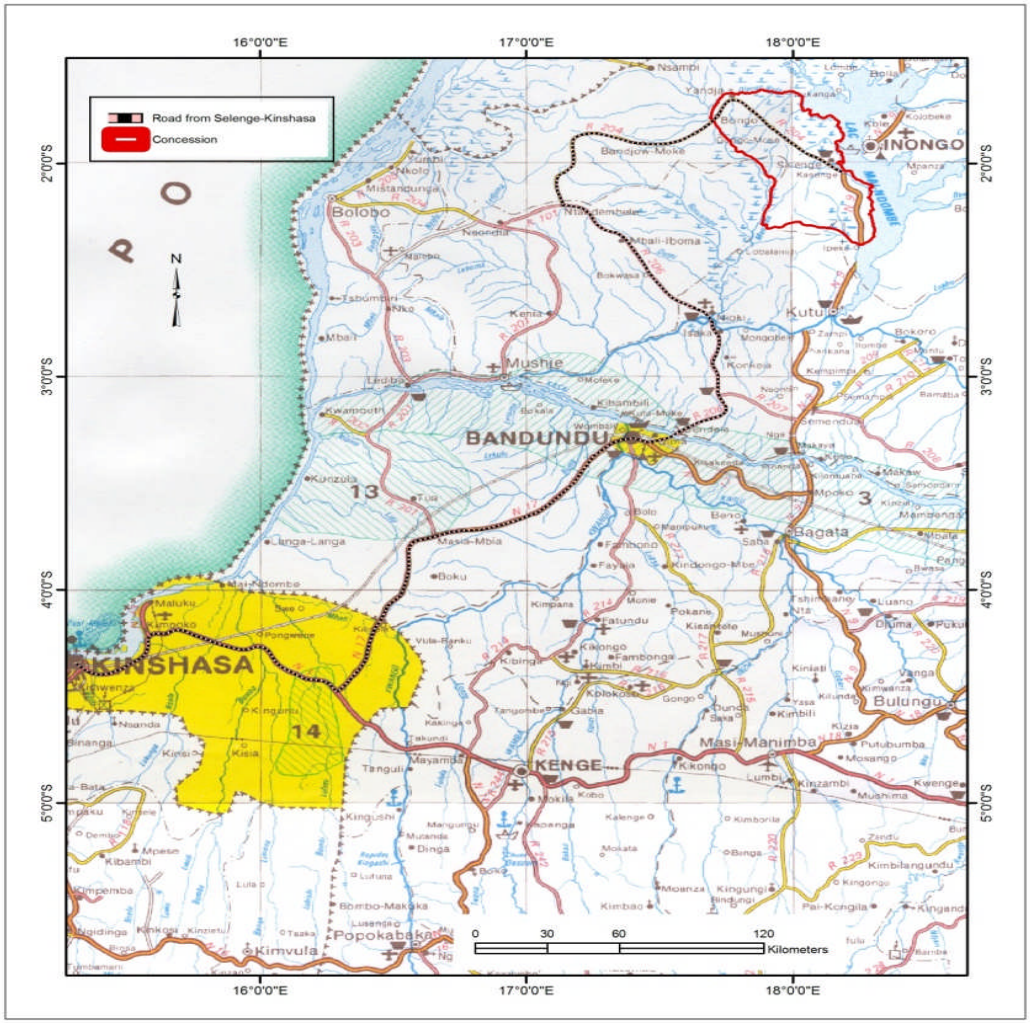
[12] In the DRC there is a growing number of illegal loggers or scieurs de long who use chainsaws to cut rough-hewn lumber in situ, side by side with charcoal production.

[13] This highway is near completion with European Union funding. It is an all-season road and the only real obstacles remaining are the high cost and irregularity of the three river ferries and one section that crosses a forested area to the west of the concession which has yet to be upgraded.

products such as cassava flour (foufou) and energy wood as well as charcoal, there would have been a significant increase in commercial production of these products.

Once the external agents have completed their work, the more entrepreneurial community members would be presented with a number of opportunities for commercial agriculture and/or energy wood production. It is relatively easy for local communities to convert these heavily degraded forests[14] into agricultural production. In the Mayombe reference area, the vast majority of primary upland forests were converted to non-forest over a similar timeline, in that case 22 years. (See appropriate CL1 subsections for more detailed information on the historical reference region.) This trend would likely have been replicated in the Mai Ndombe concession, especially with it being one of the closest major logging concessions with road access to Kinshasa.

Figure G2.5 Newly Constructed Road Connecting Selenge to Kinshasa through the Project Area

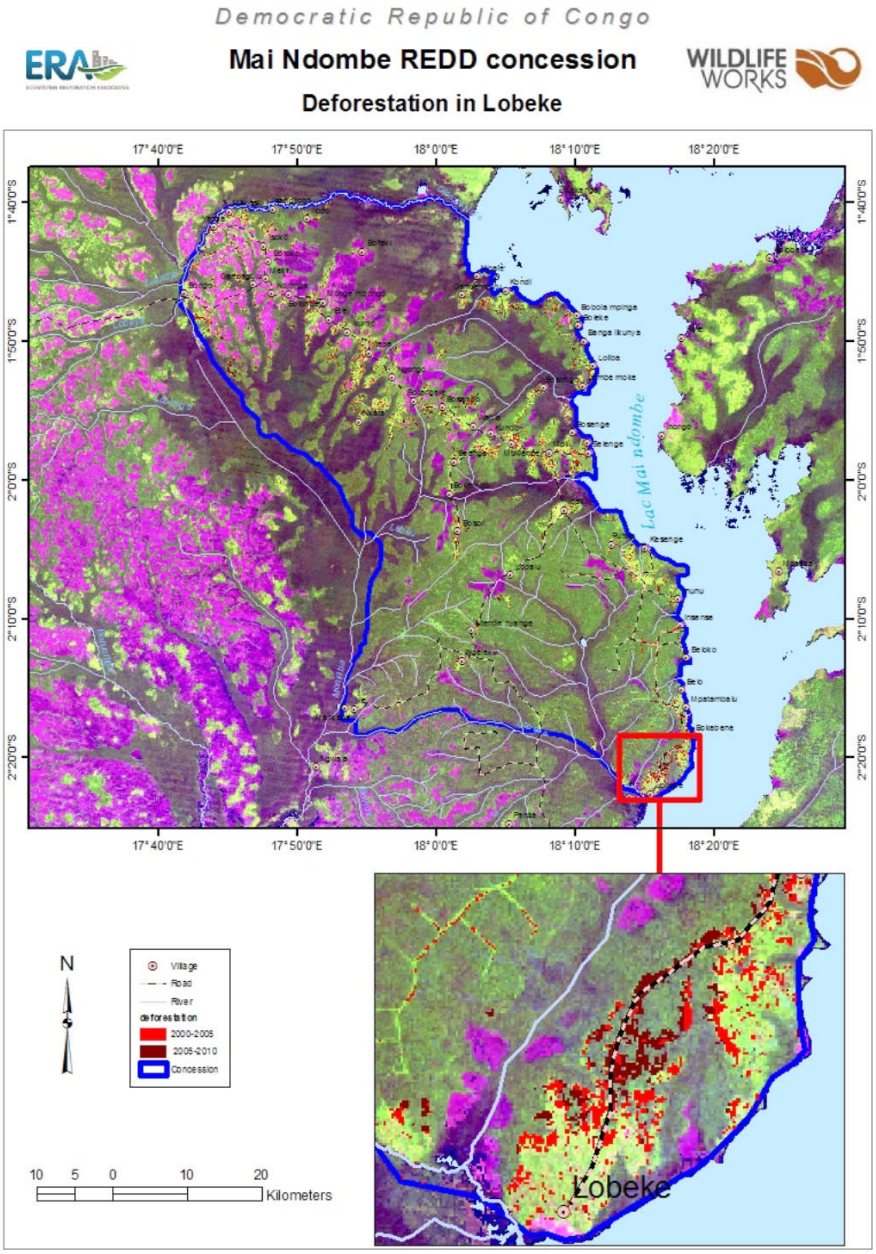


As an example of the likely conversion of primary forest to non-forest within the project area, in the southeastern community of Lobeke, cooperatives have been set up to convert the land that was logged

[14] Clearing land for agriculture in the dense, semideciduous primary forests of the Congo Basin is extremely difficult for poor communities who have only rudimentary hand tools to cut down large-diameter, high wood density trees.

adjacent to that community between 2002 and 2008 into agricultural production for commercial purposes, growing large plots of cassava for flour production destined for the Kinshasa cassava flour (fou-fou) market. Rates of deforestation have greatly increased near Lobeke as communities seize this opportunity at their doorstep (Potapov et al., 2012; see Figure G2.6).

Figure G2.6 Map Showing Greater Rates of Deforestation Near Logged Areas of Lobeke



Approximately 1200 hectares per year of primary forest were lost during the 5-year period 2005 to 2010 due to community expansion and shifting or swidden agriculture, some of which, such as bananas, is better grown in primary forests (Loyombo, 2012). This corresponds roughly to a 3% annual increase in the total non-forested area over each of those years. In subsistence agriculture as presently practiced, shifting cultivation is a necessity due to progressively diminishing yields in areas of fallow, given

inherently low soil fertility and poor agricultural practices. Communities have no resources to buy fertilizer and no knowledge or support to use nitrogen-fixing agro-forestry trees and a mixed cropping system.

As a result, in the without-project scenario, subsequent to a cascade of drivers initiated by legal concession logging and leading to a deforested state, soil productivity continues to decline. The combined effects result in a drastic loss of available livelihood resources for local communities, not only through the loss of previously available forest resources, but also via a significant reduction in agriculture potential. These stresses lead to reduced community resilience and well-being.

G2.5. How the Without-Project Scenario Would Affect Biodiversity

Describe how the without-project scenario would affect biodiversity in the project zone (e.g., habitat availability, landscape connectivity and threatened species).

General Effects

The ecology of the project region is very poorly known, and this lack of knowledge includes the documentation of current habitat conditions, a detailed understanding of successional trajectories, and identification of the main keystone species that are essential to maintain the natural ecosystems and their health (Toham et al., 2006). However, a few general ecological trajectories can be outlined for this region.

Human exploitation of tropical ecosystems can be sustainable when limits are set and observed based on understanding of the natural ecosystem and regulation of the behaviour of individuals and groups (socially and/or legally). In the absence of active protection, tropical forests and wetlands in areas of poor economic conditions generally experience unsustainable use by continually expanding human populations that demand increasing amounts of land, food, construction materials, and economic products. Under unsustainable human exploitation, tropical ecosystems follow a well-known general course: overhunting, overfishing, and severe fragmentation of forest cover, followed by complete deforestation, local extinction of most or all but the weediest native plants and animals, seasonal burning, loss of soil and soil nutrients, and sedimentation of wetlands (Laurance, 2012). This trajectory is known from the project region, and deforestation has already been documented in the project site near population centers (Lumbuenemo, 2006).

With less severe human exploitation, the environmental impact may be less. Prevention of hunting can permit recovery through animal population growth and immigration, and recovery of habitat, such as regrowth of natural forest cover, also allows animal populations to regenerate. When past selective logging is not severe and is stopped and the area protected, the forest cover and logged species can regenerate (Lumbuenemo, 2006). However, if the logging continues, even selectively, the forest's condition will continue to degrade and this habitat will be subject to the following: invasion by secondary species not normally found there, leading to further degradation; drying of the microhabitat through canopy cover removal, leading to loss of ground cover plants, understory animals, and soil microorganisms; erosion through reduced ground cover and increased direct rainfall; and even burning, if the microhabitat dries enough. In particular in the project site, degradation of the woody vegetation on the lakeshore and larger rivers leaves those areas subject to increased erosion, with increased sedimentation for these wetlands.

Selective logging in the Congo Basin at intensities typically less than 5 trees per hectare is known to deplete commercially valuable tree species by at least 40% due to insufficient recruitment/regeneration, repeated logging entries, and/or insufficient openings for exposure to light (Makana & Thomas, 2006).

For example, selective logging provides insufficient gap openings to allow effective regeneration of African mahogany (*Khaya anthotheca* and *Entandrophragma* spp.). Direct diminishment of 10–20% of arthropod, bird, and herbaceous plant species richness is also expected, with recovery without further disturbance in 5+ years (Putz et al., 2012).

Wenge (*Miletttia laurentii*, or Congolese rosewood) is the most-logged tree species in the DRC (Eba'a & Bayol, 2008) and is in high commercial demand, along with *Milicia excelsa*, also known as *Chlorophora excelsa* (Iroko), and African mahogany (*Entandrophragma* spp and *Khaya anthotheca*). Unfortunately, timber harvesting practices in both the reference area and the project site have historically been poor. Trees have been indiscriminately removed with little respect to the forestry code, including minimum diameter limits. This contributes to the removal of almost all important trees for seed production after two or three harvest entries. In addition, substantial percentages of non-targeted trees are killed or damaged as a result of not implementing reduced-impact logging procedures.

The removal of large-diameter trees during selective harvesting induces the expansion of slash and burn agriculture along the trails and roads constructed during logging operations. While the Forest Code prescribes the closure of roads and trails after logging operations this practice has typically not been implemented or effective in the area and therefore extensive deforestation follows initial logging activities.

Laurance et al., (2009) concur that the development of roads and trails provides access for hunting and land-use conversion. Empty forest syndrome (i.e., reduction in animal species) is prevalent due to both rural and urban demand for inexpensive bushmeat as a result of increased access (Nasi et al., 2011). Illegal hunting and poaching activities are also associated with the presence of logging personnel. Moreover, by changing the availability and abundance of food (leaves and fruits) the density and distribution of many mammals, including species of monkeys and apes, are greatly impacted. Primates are highly vulnerable to logging and fragmentation due to their high dependence on trees (Marsh et al., 1987) and to hunting and poaching. Bonobo populations on the site are principally in areas that have not been extensively logged.

Upland terra firma semideciduous forest can recover to original conditions if left undisturbed for a number of decades, and provided with sufficient seed source and if seedlings remain. Slash and burn agriculture expansion and fire, however, are important factors that contribute to preventing forest recovery (Hall et al., 2003, Makana & Thomas, 2006). A number of species of fish depend on inputs of nutrients from surrounding forests, including animal and plant materials from swamp forests located along major rivers and streams. Logging will almost certainly reduce that material input by reducing the overhanging vegetation.

The response of plant communities to fragmentation in the Congo Basin is not well understood. Forest fragmentation alters a number of ecosystem processes by changing community composition or species behaviour. It has been hypothesized that most ecosystem processes related to plant establishment and survival, such as pollination, recruitment, seed dispersal, and germination, and seedling production and survival are negatively impacted by fragmentation (Ghazou, 2005). In particular, fragmentation reduces pollinator abundance and creates isolation and gaps between populations that cannot be bridged by pollinators. Seed germination may also be impacted by high temperatures, drier conditions, and increased light penetration.

In all of these scenarios, protection from further human exploitation makes the difference between continuing environmental degradation, and preservation of the site in its current reasonable to very good ecological condition. However, these are not the conditions of the without-project scenario. In the without-project (or baseline) scenario, most of the primary terra firma forest would be logged over the

25-year period of the timber concession. In the without-project scenario, a series of cause and effect events triggered by the initial logging entry is anticipated to lead to a sequence of forest degradation, loss of biodiversity, and eventual deforestation due to underlying influences or drivers such as population growth, increased access to forest resources, and the need for livelihood activities. The anticipated sequence is as follows: selective logging; a resultant increase in the unplanned extraction of forest resources (charcoal, fuelwood, local construction materials, non-timber forest products, bushmeat) due to increased access; swidden agriculture leading to a permanently deforested state; irreversible degradation of soil productivity due to loss of forest cover and unsustainable agricultural practices. The expected result of this sequence with respect to biodiversity and ecosystem integrity is forest fragmentation (i.e., a loss of landscape connectivity), a decrease in or extinction of species, loss of habitat, loss of soil nutrients, and sedimentation of wetlands.

G3. Project Design and Goals

G3.1. Major Climate, Community, and Biodiversity Objectives

Provide a summary of the project's major climate, community and biodiversity objectives.

The Mai Ndombe REDD project aims to leverage the financing from the revenues of carbon offset sales to achieve the following climate, community, and biodiversity objectives in the project area. Community and biodiversity objectives, along with the corresponding project activities outlined in section G3.2, have been designed to correspond to and address issues identified by project area communities (see section G1) as important to their well-being, and which have been identified as key factors contributing to present and anticipated future project area conditions in the absence of the project.

Climate

- Reduce CO_2 emissions from the project area through stopping planned legal, and reducing unplanned illegal logging, charcoal production, and slash and burn agriculture.[15]

Community

- Enhance livelihoods and food security for communities in the project area.
- Increase local administrative and governance capacity through support of existing traditional and contemporary governance structures.
- Enhance the sustainable use of natural resources.
- Improve access to, and quality of, health and education.
- Improved access to, and quantity of, potable water.
- Improve community well-being.

Biodiversity

- Retain intact forests and ecosystem integrity at the landscape level.
- Retain and promote recovery of habitat as well as native flora and fauna.
- Retain rare and ecologically valuable species.
- Increase local and outside knowledge of the area's biodiversity values.

G3.2. Project Activities

Describe each project activity with expected climate, community and biodiversity impacts and its relevance to achieving the project's objectives.

The Mai Ndombe REDD project consulted with the local populations within the project area in early 2011 in anticipation of the signing of its forest conservation concession contract and negotiated and executed a social chapter, which is a signed agreement with representatives of the local communities of the districts in which the project area is located. The social chapter describes specific investments and activities that will be undertaken by the Mai Ndombe REDD project throughout the duration of the project, outlines how the revenue generated by the project that is to be provided to the local communities is to be managed, and sets out how decisions related to direction and execution of project

[15] Reduced CO_2 emissions from stopping charcoal production and slash and burn agriculture will not take place in secondary forests and areas excluded in the VCS quantification area.

activities are to determined. This document also states that infrastructure construction and activities not contemplated by the social chapter may be integrated in the future by way of an amendment by mutual agreement between the local communities and the Mai Ndombe REDD project.

Along with a provisional forest management plan, the social chapter forms part of the supplemental terms of reference to the forest conservation concession contract which was signed between the Minister of the Environment, Conservation of Nature, and Tourism (MECNT) and ERA Congo SPRL, a DRC subsidiary of ERA Ecosystem Restoration Associates Inc, on July 30, 2011 (see sections G3.8 and G5.2 for more detail on the consultation process described above and these agreements).

The social chapter and the provisional forest management plan are to be further developed by ERA Congo in the form of two PDDS and submitted for approval to MECNT (see the introduction of the provisional forest management plan). As required by the Forest Code (Art. 10), under Article 9 of the forest conservation concession contract, the Mai Ndombe REDD project is to prepare a development plan which replaces these documents within a maximum period of four years after the signing of this agreement. This development plan is to include all of the obligations of the Mai Ndombe REDD project with a view to ensuring sustainable management of the forest.

Given the above framework, project activities will be defined and refined on an ongoing basis through consultations with the communities within the concession boundaries, as well as other stakeholders and government.

The social chapter defines the responsibility of the Mai Ndombe REDD project toward the concession area communities with regard to infrastructure projects. It is one of the project's primary obligations under the forest conservation concession contract. In the social chapter, the project commits to the following specific activities in support of community well-being:

- Build a minimum of 19 schools*
- Construct healthcare centers in 5 villages
- Repair and extend secondary hospitals in 2 villages
- Assist transportation to off-concession markets for agricultural and other products
- Provide a network of rural canteens[16]
- Improve agricultural and aquaculture production techniques*
- Recruit employees from the local community*
- Establish local development committees*

*Cahier de charges commitments that have already begun

A further participatory planning process is currently being undertaken by the Mai Ndombe REDD project to define project activities and further refine the roles and obligations of the local development committee (CLD) structure that will be additional to what is in the social chapter. This process will be fundamentally community driven through CLDs, the participation of traditional chiefs, and the creation of local development plans and incorporated into the development plan to be submitted to MECNT. As such, it is premature to describe all eventual project activities in detail at this time. They can, however, be broken down into four separate but connected activity areas, as described below. Some specific activities have already been defined, and implementation has already commenced in some cases; these are listed as defined activities. Progress on these activities will be discussed in the first project

[16] In this context a canteen is a small store where staple products only available outside the village are supplied at reasonable and stabilized prices.

implementation report (PIR). Other activities are under consideration and will be implemented as appropriate after consideration by the CLDs, completion of appropriate due diligence and feasibility considerations, and additional funding is available; these are listed as additional activities undergoing investigation and further consultation.

Accompanying each set of activities is a list of positive impacts anticipated to result from their implementation. These impacts have been derived through the use of theory of change models detailed in the community and biodiversity sections of this document. In addition to expected positive impacts, potential negative impacts resulting from project activities are also listed in accordance with CCB requirements. It is important to note that the negative impacts listed are not necessarily considered to be of particular or significant concern for the project. They are potential impacts commonly associated with similar projects. Furthermore, some of the project activities, for example, some of those related to agricultural improvement and community capacity building, are focused toward mitigating potential negative impacts, rendering them a non-threat. More detail on potential negative impacts, including monitoring activities to ensure they do not become an issue, can be found in the respective community and biodiversity sections.

Activity Area 1: Climate and Ecosystem Conservation Activities

Defined Activities

- Conversion of the land-use concession from a logging to a conservation focus
- Monitoring and reduction of unplanned illegal logging
- Educational efforts to increase knowledge about the importance of biodiversity
- Collection of data to increase knowledge of local plant and animal biodiversity

Also see activities listed under Agricultural Improvement and Diversification related to reductions to extraction-related pressure on forests.

Additional Activities Undergoing Investigation and Further Consultation

- Activities related to the monitoring and reduction of hunting
- Energy wood plantations to reduce demand on native forests
- Ecotourism

Expected Positive Impacts

- Retention of intact forest cover, biomass, habitat, and species
- A cascade of drivers from forest to non-forest condition is avoided
- Reduction in GHG emissions
- Ecosystem integrity, intact floral and faunal biodiversity in project zone

Potential Negative Impacts

- Reduced employment from forest-extraction-related activities
- Reduced access to land for agriculture, with associated employment and food cost implications
- Reduced access to NTFP and other forest resources
- Potential conflict over the allocation of carbon-offset-funded activities

Activity Area 2: Community Capacity Building and Social Capital

Defined Activities

- Workshops and associated facilitation to support the improvement of local democratic governance, planning. and management processes
- Establishment of local development committees (CLDs) in each major village to facilitate participatory planning processes
- Creation of community-driven local development plans that will determine and provide direction for project activities

Additional Activities Undergoing Investigation and Further Consultation

- Training specific to governance, decision making, networking, planning, and management skills

Expected Positive Impacts

- Increased ability to collectively and locally respond to community issues
- Increased local capacity for governance, administration, and problem solving
- Improved community well-being

Potential Negative Impacts

- Potential conflict over the management and allocation of carbon offset funding

Activity Area 3: Infrastructure Development and Education, Health

Defined Activities

- School construction
- Provide mobile medical clinic(s)
- Construct healthcare centres
- Repair and extend secondary hospitals (coordinated with territorial health and education authorities)

Additional Activities Undergoing Investigation and Further Consultation

- Provide a network of rural canteens (in cahier de charges but specific approach is under development)
- Roof-based water collection
- Micro-credit project(s)
- Targeted micro-projects – current example: football gear and balls (see section CM1.1)

Expected Positive Impacts

- Reduction in cost of living
- Increased level of education in communities
- Increased local capacities
- Increased life expectancy
- Reduced child mortality and disease transmission

Potential Negative Impacts

- Conflicts related to the equitable distribution of benefits

Activity Area 4: Agricultural Improvement, Diversification and Economic Opportunities

Defined Activities

- Develop agroforestry demonstration plots to test and demonstrate agricultural multicropping, diversification, and intensification
- Facilitate the construction of animal enclosures to prevent spread of diseases and damage to crops

Additional Activities Undergoing Investigation and Further Consultation

- Transportation assistance to off-concession markets (in cahier de charges but approach and impacts are under consideration)
- Assistance with commercialization of agricultural products
- Land-based aquaculture
- Sustainable employment generating activities including:
    - Rehabilitation of existing organic Hevea (rubber) plantations and establishment of preliminary processing units for rubber extracts
    - Production of Moringa-based products for domestic African regional and international markets

Expected Positive Impacts

- Increased quantity, diversification, and value of crops
- Improved nutritional value of crops
- More sustainable practices
- Reduced pressure on ecosystem
- Improved resilience to crop failure and market fluctuations
- Increase employment opportunities
- Improved well-being

Potential Negative Impacts

- Increased cost of living if value of crops increases
- Conflict related to unequal distribution of benefits and workload

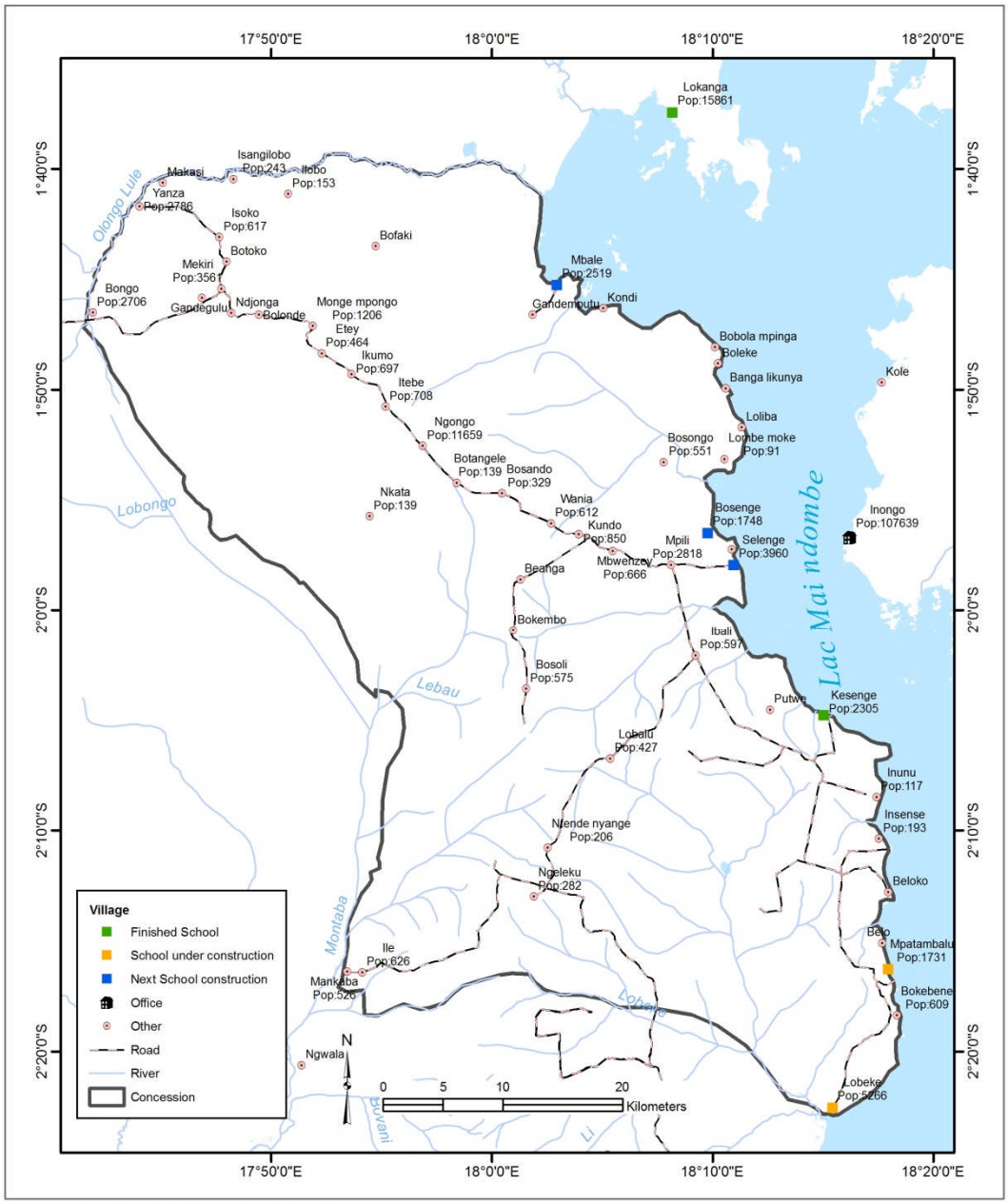
G3.3. Project Location, Boundaries of Project Area, and Location of Project Activities

Provide a map identifying the project location and boundaries of the project area(s), where the project activities will occur, of the project zone and of additional surrounding locations that are predicted to be impacted by project activities (e.g., through leakage).

The project location in the context of the surrounding areas is depicted in Section G1.1 Figure G1.1. The boundaries of the project area are shown in Section G1.1 Figures G1.1 and 1.3, as well as Section G1.3 Figure G1.6, and the figures below. The location of project activities that have been fully defined and determined during the cahier de charges community input process (see section G3.2), some of which have already begun, are shown in the figures below. Due to the long-term nature of this project and the fact that the exact locations of future activities will be determined through participatory processes, it is

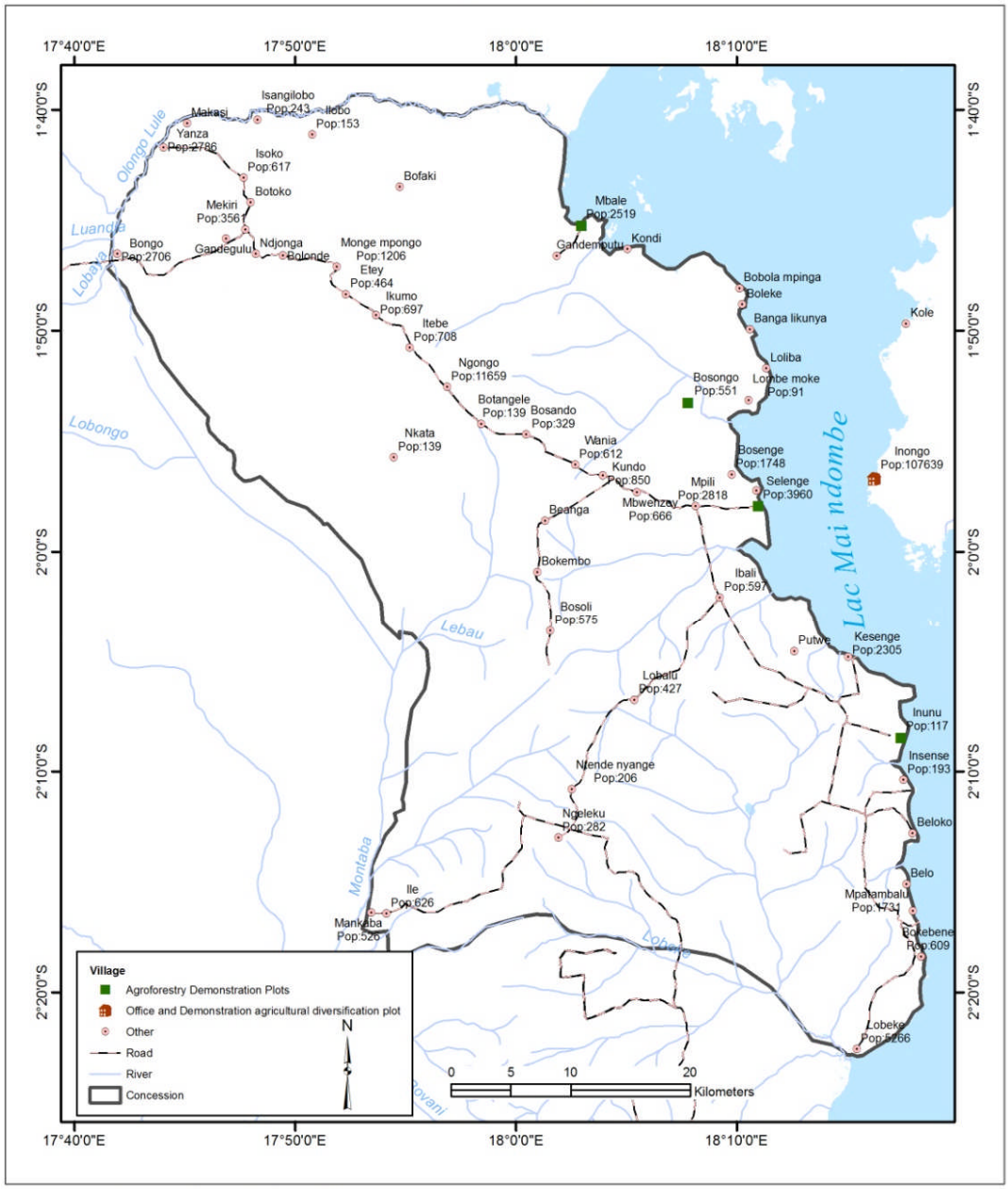
not possible to designate the location of all activities that will take place over the 30-year project period. It is anticipated that all activities will be located within the project area and the project zone.

Figure G3.1 Location of School-Building Activities



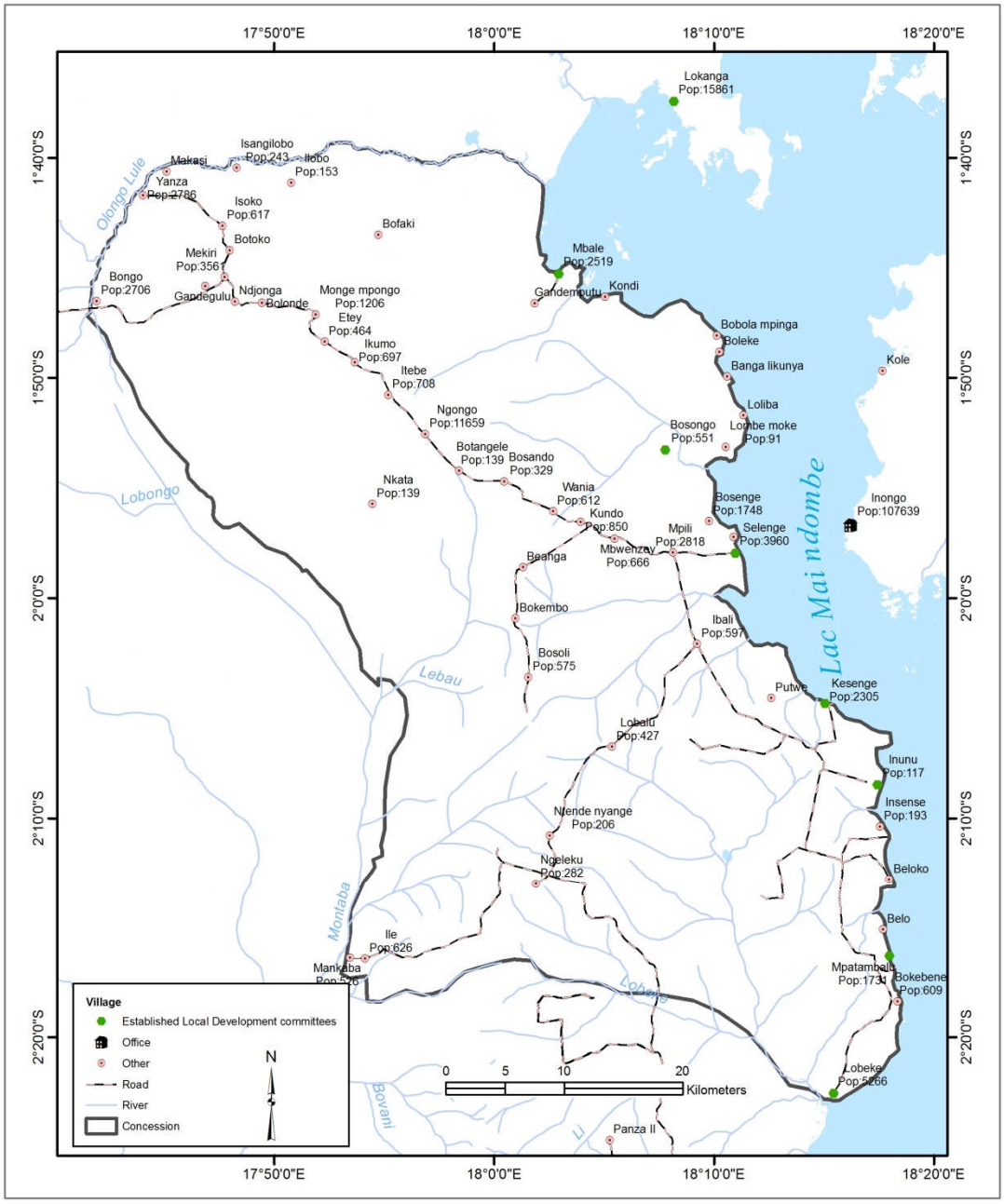
Source : Service statistiques/Territoire d'Inongo
Statistique de l'an 2011

Figure G3.2 Location of Agroforestry Activities to Date



Source : Service statistiques/Territoire d'Inongo
Statistique de l'an 2011

Figure G3.3 Location of Local Development Committees



Source : Service statistiques/Territoire d'Inongo
Statistique de l'an 2011

G3.4. Project Lifetime and GHG Accounting Period

Define the project lifetime and GHG accounting period and explain and justify any differences between them. Define an implementation schedule, indicating key dates and milestones in the project's development.

Table G3.1 Project start date and crediting period.

Project start date	March 14, 2011
Crediting period	March 14, 2011 to March 13, 2041
Reverifications	Annually

Table G3.2 Dates of major project milestones and activities committed to date.

Stakeholder consultation process	July 2010 – ongoing
Carbon rights agreement signed	March 14, 2011
Cahier de charges signed	March 26, 2011
Forest conservation concession contract signed	July 30, 2011
Opening ceremonies in DRC	August 2, 2011
School construction	October 2011 – ongoing
Participatory rural appraisal	March – April 2012
CLD building	February 2012 – ongoing
Health centre infrastructure improvement	TBD
Transportation to markets	TBD
Rural canteens	TBD
Agroforestry and aquaculture activities	September 2012 – ongoing

G3.5. Risks to the Expected CCB Benefits, and Measures to Mitigate Them

Identify likely natural and human-induced risks to the expected climate, community and biodiversity benefits during the project lifetime and outline measures adopted to mitigate these risks.

Civil or Political Instability

The Lac Tumba landscape area in which the Mai Ndombe project is located has been minimally affected by civil war and other upheavals that have occurred in the DRC since independence 50 years ago. The DRC is the size of Western Europe and has a very sparse road network, to the extent that chronic conflict in the eastern provinces has minimal effect on the western sectors of the country.

The DRC is emerging from a long period of high instability and civil unrest between 1996 and 2004. Political and ethnic violence, combined with ingrained corruption, are generally still significant challenges. During the 1996–2004 civil war, however, the Mai Ndombe region was virtually unaffected, the forestry concessions were able to continue, and state policies, laws, regulations, and contracts were upheld. This area is one of the most immune in the DRC to political and social upheaval. In the history of the DRC, forestry concessions have rarely been the subject of arbitrary (extra-legal) takeover by third parties.

Beyond the relative stability of the area, the project does not depend logistically on government competence. State presence in the Mai Ndombe region is very limited, and travel in and out of the project area is done by chartered plane. In an extreme event where air travel in and out of Kinshasa was not feasible, air travel from neighbouring Congo Brazzaville would be a similar distance.

Compensation for project activities is structured in a way that the project provides greater benefits to the state and stakeholders than any timber extraction or alternative use could. The Mai Ndombe project is confident that our in-country capacity and clear state and community stakeholder payment structures are designed in a robust, fair, and uncontested way (i.e., the project is in control of the payments as the monetized VCU revenue comes to the joint venture) that provides an inherent level of protection from third parties that could seek to revoke the concession contract.

Community support for the project is strong. Multiple consultations have been carried out in each major village and/or seat of traditional authority, and consent to develop the project in a participatory manner has been given by all traditional authorities. A further inclusive awareness-raising process is underway to achieve deeper free prior informed consent. The participatory methods of project development allow for social issues, concerns, and ideas to be heard and adjustments to be made.

Land Tenure

The DRC government, land owner of the two concessions, has legally approved the project by signing the Forest Conservation Concession and the carbon rights agreement (CRA).

The DRC was one of the original 7 REDD-readiness countries identified by the World Bank's Forest Carbon Partnership Facility (FCPF), and it stands to benefit greatly from FCPF and UN REDD initiatives through official development assistance (ODA) monies. Because the Mai Ndombe project could potentially be integrated into a broad strategy that involves funding from bilateral donors and international financial institutions such as the World Bank, potential access to these funds will be a strong incentive for maintaining the CRA and thus potentially providing access to this market-based carbon financing.

The 32,000 individuals living within the project area have customary land-use rights to goods derived from working the land. However, these rights are not clearly articulated in the Forest Code, and are often not respected in practice. In accordance with the requirements of the concession contract process, local leadership in the project area has given consent to ERA to develop the REDD+ project. ERA's plans to maintain a close, collaborative relationship with these communities will minimize any risk of this consent being put in jeopardy.

Illegal Activities

Any significant logging activity is easily monitored and detected. The risk of this type of activity affecting the climate benefits is very low. As well, the key merchantable timber species, Wenge, has a specific gravity of >1, which means it cannot be boomed or floated down rivers for transport. Transport requires road construction, which is easily detected and halted at an early stage. The Mai Ndombe project will work with timber concession holders remaining in the area to minimize the risk that their activities will trespass onto the conservation concession. Preliminary discussions with timber operators in the north indicate a possibility that they could be involved with the supply of construction materials for activities planned under the cahier de charges. This manner of collaboration with community partners and other actors is anticipated to result in sustainable "win-win" livelihood enhancement solutions throughout the project area.

Small-scale illegal and subsistence activities such as wood extraction for charcoal and local building supplies are expected to continue at a reduced rate. To minimize the risk of reducing important livelihood activities and the possibility that these activities will materially affect climate benefits, a 2-km zone has been established around each village. These zones have been excluded from the carbon quantification area. The incorporation of an incentive-based component to community forest stewardship payments will be considered and consulted.

Fire, Disease, and Other Natural Risk

The project area consists principally of dense, diverse, mostly intact, humid, primary equatorial rainforest. Because of the Congo Basin's moist climatic regime and high tree diversity, these forests inherently have low susceptibility to catastrophic fire, insect, disease, and blow-down events as there is no ENSO-like drought period in the region.[17]

Despite this climate, the project area experienced an exceptionally dry year in 2011 that led to burnt areas in the southeastern part of the concession. These events are comparable to the Brazilian Amazon-like burn events described by Cochrane in numerous studies (Cochrane & Schulze, 1998, 1999; Cochrane & Laurance, 2008). Rampant forest fire from neighbouring savannas outside the project area spread out inside the concession after crossing a dried-out swamp forest. Nearly 2700 hectares of forest were burnt during that dry season. Such droughts have been extremely rare in the past. However, the dynamic may change due to local climate change and/or variability. The Mai Ndombe REDD project's protection of intact forests and landscape-scale ecosystem integrity is the best available means for mitigating the impacts of climate change and reducing the risk of fire.

G3.6. Measures to Ensure the Maintenance or Enhancement of High Conservation Values

Demonstrate that the project design includes specific measures to ensure the maintenance or enhancement of the high conservation value attributes identified in G1 consistent with the precautionary principle.

The following biodiversity- and ecosystem-related HCVs were identified in section G1.8.1–3:

- 7 endangered and vulnerable plant species and one endangered mammal species
- 5 endemic plant species and 1 endemic plant subspecies
- Lakeshore zones, forested swamps and streams, and unlogged upland and swamp forest transitional zones that support significant concentrations of a species during any time in their life cycle
- Viable populations (conservatively assumed) of plants and animals in natural patterns of distribution and abundance
- Threatened terra firma and swamp forest.

Conversion of the land-use concession from a logging to a conservation focus is the best possible measure available to ensure the maintenance or enhancement of these high conservation values, by maintaining the species, landscapes, and ecosystems of the project area intact and non-fragmented. Several of the project activities (see section G3.2) are oriented toward further ensuring that the conservation-related goals of the Mai Ndombe project are achieved and HCVs maintained. These include

[17] ENSO events are those in which a southern oscillation extreme and an El Niño occur together.

increasing local awareness and capacity for conservation, generation of livelihood alternatives to reduce pressures on the forest (including agricultural intensification), and active monitoring.

The following community-related HCVs were identified in section G1.8.4–6:

- Forests critical to water catchments; forests that provide barriers to destructive fire
- Areas fundamental to meeting the basic needs of local communities, specifically food, medicines, fuelwood, and raw material for building and crafts
- Areas critical for communities' traditional cultural identity, specifically sacred sites, resources for artistic and traditional purposes, and importance to local worldview

Similar to the measures outlined above, conversion of the land-use concession from a logging to a conservation focus will result in the best possible outcomes with respect to the maintenance of forests critical to water catchments, forests that provide barriers to destructive fire, forest areas fundamental for food, medicines, fuelwood, material for building and crafts, forests associated with sacred sites and resources for artistic and traditional purposes. These values depend on the continued existence of intact forests in the project area and this is exactly what the Mai Ndombe project provides. In addition, the Mai Ndombe project is helping ensure the maintenance of specific spiritual sites by respecting the secrecy of their location and consulting with chiefs with respect to the planning of project activities to ensure that developments such as school construction do not disturb these important sites.

G3.7. Measures to Enhance CCB Benefits Beyond the Project Lifetime

Describe the measures that will be taken to maintain and enhance the climate, community, and biodiversity benefits beyond the project lifetime.

The Congolese Forest Code states that the concession contract can be renewed for an additional 25-year term (Art. 21). While it is not possible to know with certainty whether the concession will be renewed, several project activities are focused toward improving local capacities for governance, management, decision making, and increased awareness of and capacity for sustainable resource stewardship. These activities will help empower local communities to self-determine sustainable pathways for achieving climate, community, and biodiversity benefits well beyond the project lifetime.

G3.8. Stakeholder Identification and Involvement in Project Design

Document and defend how communities and other stakeholders potentially affected by the project activities have been identified and have been involved in project design through effective consultation, particularly with a view to optimizing community and stakeholder benefits, respecting local customs and values, and maintaining high conservation values... Project developers must document stakeholder dialogues and indicate if and how the project proposal was revised based on such input. A plan must be developed to continue communication and consultation between project managers and all community groups about the project and its impacts to facilitate adaptive management throughout the life of the project.

The Mai Ndombe REDD project has adopted a multiphased approach to stakeholder engagement which includes communication of important project information; it is designed to ensure that stakeholders are able to impact project design, air grievances, and give or withhold free prior and informed consent to participation in project activities. The stakeholder engagement process is designed to continue throughout the project lifetime in order to inform all stages of project development. Communities and stakeholders will participate with and provide input to the project monitoring program and the review/

revision of problem flow and theory of change models to ensure their continued relevance. This process will form the basis for ongoing adjustment and continual improvement to project activities, in the spirit of adaptive management. Major phases of stakeholder involvement are outlined below, along with their current status.

Table G3.3a Major phases of stakeholder involvement.

1. Initial Consultations	
Date	June 2010 to November 2010
Current Status	Completed
Purpose	a) Introduce project staff and the project proponent to communities. b) Become familiar with potential stakeholder communities. c) Raise local awareness about climate change, carbon offsets, and REDD. d) Propose the Mai Ndombe REDD project to stakeholders. e) Seek consent from local authorities to develop the project further.
Description	Following the suspension of BIMPE AGRO forest concession titles, a number of trips were undertaken to villages within the project area. According to regional custom, forests are administered by a land chief in the name of the clan; therefore, villages where clan chiefs resided were visited first (see Figure G1.7 for map and Table G5.1 for signatories of community consent forms). Initial visits consisted of introductions to concepts such as carbon cycles and REDD, introductions of project staff, and an initial project proposal. Lengthy question periods followed and were transcribed. Initial visits and question periods typically lasted between 2 and 4 hours. Each visit received at least one follow-up visit on a subsequent day. Over a period of weeks, communities were given opportunities to ask questions and discuss the project internally (while project proponents were not present). This process culminated with each of the visited villages granting authority to develop the project. It should be noted that granting permission to develop the project is separate and distinct from consenting to participate in REDD+ project activities, which is a step that occurs at a later stage in stakeholder engagement.
Supporting Documentation	Minutes from initial consultations; signed consent forms; Lingala, English translation of consent forms.

2. Negotiation of the Terms of Reference (Cahier de charges)	
Date	January 2011 to March 2011
Current Status	Completed
Purpose	a) Reach a signed agreement with local authorities on a basic land management plan for the proposed project, as required by MECNT. b) Reach a signed agreement with local authorities regarding basic socioeconomic compensation under the proposed project, as required by MECNT.
Description	ERA representatives and the Territory Commissioner travelled throughout the project area with a cahier de charges document (in English, the forest conservation concession contract terms of reference), which is composed of a social chapter (clause sociale) and a provisional land management plan (plan de gestion du territoire). These documents are required by MECNT for all concession holders. Its format was designed for more traditional resource extractors rather than conservation concession holders. Multiple rounds of community consultations took place throughout early 2011 in which communities discussed options for compensation from ERA under the proposed REDD project. This negotiation process culminated in (1) the clause sociale that laid out plans for ERA to build schools in the concession, and (2) the plan de gestion du territoire that described, in general terms, how land would be managed under the proposed REDD+ project. Specifically it was agreed that primary forests would be protected and a buffer would be established between secondary forest and primary forest (priority conservation areas). Most stakeholders acknowledged the value of conserving the primary forest, and raised concerns regarding the expansion of their agricultural activities in regard to the likely population increase in their villages. To address this concern, the project is working on agriculture intensification projects aimed at increasing production in currently used agricultural plots. During extensive public consultations, these documents were revised, agreed to, and signed by representatives of the 23 communities that are the seat of clan-owned forests. ERA subsequently signed a forest conservation concession contract with MECNT which granted the company the rights to manage the forest within the concession area for 25 years.
Supporting Documentation	Cahier de charges.

3. Participatory Rural Appraisal Process	
Date	February 2012 – Ongoing
Current Status	Has begun in the following villages: Lukanga, Mpili, Selenge, Kundo, Ngongo, Mbale, Bosongo, Inunu, Ikita.
Purpose	a) Identify livelihoods and land uses. b) Establish baseline socioeconomic information. c) Gather preliminary information to further inform future project activities.
Description	Currently two types of participatory rural appraisals (PRAs) have been carried out in the project area. The PRA process will continue in both new communities and communities that have already begun the process. The first PRA was geared to obtain extensive information about the population living in representative villages from each tribe in the project area, including their poverty level, resource use, demographic information, and access to schooling and health care. The information from the generated report will be used to inform decision making in approaches toward addressing major community issues and assisting the communities to design local development plans for future project activities. The PRA was structured by a 150-question survey that was conducted during community workshops held by project animateurs (community facilitators) in villages representing each of the three tribal groups as well as a community of Pygmies. The workshops were held separately for women, men, and children in each village. In addition to these workshops, the animateurs recorded direct observations and held individual interviews in randomly selected households to corroborate information. It was found during this process that some of the questions to do with areas of cultural importance and resource value were either taboo or considered suspicious by communities. For this and the reasons noted below, the PRA was revised. As stated above, the first PRA survey did not capture the information required to objectively characterize startup socioeconomic conditions in a way that future positive impacts could be monitored in a consistent and sustainable manner. For that reason, the project initiated a revised format rapid rural appraisal survey in an additional four communities. In the second PRA, households were stratified by location and wealth. A random sample of households within each stratum was selected for questioning. A goal of 5% of households was established; however, as the size of villages varies so greatly, no more than 50 and no less than 5 households were surveyed. Surveyors ensured that questions were asked of both males and females. All of the responses were added to a database and the results have been analyzed for use as a component of socioeconomic baseline of communities.
Supporting Documentation	First PRA survey questionnaire; community PRA Standard Operating Procedures; report on first PRA; report on second PRA.

4. Land Chief Participatory Mapping Process	
Date	March 31, 2012 – Ongoing
Current Status	Mapping: complete; verification with community: underway.
Purpose	a) Provide the chefs de terre (chiefs of the land) with further information about the project and give them an opportunity to ask questions and voice concerns. b) Undertake the first step in a participatory territorial mapping exercise whereby the chefs de terre get together and apply their traditional known territorial boundaries on a GIS map.
Description	Nearly all 44 of the chefs de terre travelled from locations throughout the project area to meet in Inongo for a two-day workshop. Project management and the chefs de terre discussed the newest project developments, and opportunity was provided for concerns to be voiced and questions to be answered. The participants were provided with maps of the concession and then broke into smaller, geographically defined groups. Sometimes beginning in the dirt (as shown in Figure G3.4) and then transferring information to paper and finally to Mai Ndombe REDD project maps, they were able to define and agree on their territorial boundaries. This information was then transferred to a GIS map and projected onto a wall for further review and modification. The map that was finally agreed upon will now be circulated throughout the project area for further verification. The entire process was met by much interest by participants because it was the first time they had been able to review such a map of their forest boundaries. This is one step in the process that the Mai Ndombe project is taking to understand and respect territorial boundaries.
Supporting Documentation	Draft map of territorial boundaries (see Figure G1.7).

Figure G3.4 Chefs de Terre of the Mpongo Clan Brainstorm Clan Boundaries in the Soil

Figure G3.5 Transferring Agreed Boundaries to Maps

Figure G3.6 Discussing the Final Workshop Draft (projected on wall)

Table G3.3b Major phases of stakeholder involvement, continued

5. Community Workshops Regarding Climate Change & Ecosystems	
Date	April 2012 – Ongoing
Current Status	Workshops have been held in the following villages: Lukanga, Selenge, Mbale, Bosongo, Inunu, Mpata Mbalu, Lobeke, Kesenge, Ikita.
Purpose	a) Discuss with villages the importance of local forest and other ecosystems. b) Gain knowledge from communities about their resource use and if/how it is changing. c) Provide information on the importance of local ecosystems on a global scale.
Description	Animateurs held workshops in schools, with community groups, elders, farmers, and women's groups to discuss and debate issues regarding climate change, the environment, the REDD framework, and the larger goals of project activities. Often during this process community members discussed what resources are important to them and how this resource use has changed or what changes they may fear or perceive with these resources. Minutes from the majority of these meetings are on file at the project office.
Supporting Documentation	Notes from animateur meetings and workshops with communities.

6. CLD Building Process	
Date	April, 2012 – Ongoing
Current Status	CLDs have been established in the following villages: Lukanga, Selenge, Mbale, Bosongo, Inunu, Mpata Mbalu, Lobeke, Kesenge.
Purpose	a) Comply with MECNT guidelines. b) Establish a structure where project benefits will be democratically distributed and development activities will be planned in a participatory way for each village. c) Create a democratic decision making structure where by community wide decisions can be considered and approved.
Description	The project is in the process of assisting communities to establish village-level local development committees (comités local de développement – CLDs). These committees will inform and guide the project's social component and participate in preparing the final version of the land management plan for the project. In addition, each CLD will receive community input and create a local development plan for their own village. A local development fund that will hold the project benefit share for each community will also be set up and managed through the CLD structure. In compliance with the current regulations, it was agreed that the social component of the cahier de charges will be funded through the local development fund. Finally, it was agreed that an overall project-level CLD, which will include members elected from the villages, will oversee the project's social component, including the sharing of benefits resulting from the project, on behalf of their communities.
Supporting Documentation	CLD statutes; CLD capacity building documents; CLD member lists.

Figure G3.7 A CLD Meeting with the Animateurs in the Village of Mbale, May 2012

Table G3.3c Major stages of stakeholder involvement, continued

7. Local Development Plan Process	
Date	Estimated to begin in Q4 2012
Current Status	Not started.
Purpose	Each community, with the guidance of the CLD, must submit a plan for development activities to the Mai Ndombe project.
Description	Proposals will include description, timeline, and budget of proposed activities and will be funded by the revenue from carbon offset sales.
Supporting Documentation	CLD capacity building documents; CLD statutes.

G3.9. Steps to Communicate and Publicize the CCB Public Comment Period

Describe what specific steps have been taken, and communications methods used, to publicize the CCBA public comment period to communities and other stakeholders and to facilitate their submission of comments to CCBA. Project proponents must play an active role in distributing key project documents to affected communities and stakeholders and hold widely publicized information meetings in relevant local or regional languages.

The following steps will be taken to ensure that all stakeholders have access to the project design document (PDD) and are aware of and provided a means to comment on the document during the public comment period.

- An executive summary of the PDD will be made available in French and Lingala at the following locations: the project office in Inongo; with village chiefs in Mbale, Ngongo, Selenge, Mpta Balu, and any other locations that request a copy.
- News of the public comment period will be published in the September edition of the bimonthly Mai Ndombe REDD project newsletter and circulated throughout the project area. This newsletter has a circulation of over 2000 copies.
- The project proponent is a regular guest on the local radio station, which holds a question and answer session on project activities. At least one of these sessions will be held to announce that the PDD and summaries are available for comment.
- Village meetings to discuss the PDD and the public comment period will be held in the larger villages of each groupement.
- A computer will be made available at the project office in Inongo for making comments directly on the CCB website. Public comments received in writing at the project office will be scanned and emailed to the project validator.

G3.10. Process for Handling Unresolved Conflicts and Grievances

Formalize a clear process for handling unresolved conflicts and grievances that arise during project planning and implementation. The project design must include a process for hearing, responding to, and resolving community and other stakeholder grievances within a reasonable time period. This grievance process must be publicized to communities and other stakeholders and must be managed by a third party or mediator to prevent any conflict of interest. Project management must attempt to resolve all reasonable grievances raised, and provide a written response to grievances within 30 days. Grievances and project responses must be documented.

The Mai Ndombe REDD project strives to minimize the possibility of conflicts and grievances by maintaining close linkages and working proactively with affected communities and stakeholders throughout the project area, as well as offering an open-door policy for staff wishing to talk about issues they may be facing. In the case that conflicts or grievances arise, the Mai Ndombe REDD project has a conflict and grievance resolution policy and process, the purpose of which is to provide an efficient, fair and accessible mechanism for resolving complaints and conflicts, and ensure that the process is transparent and comprehensive. In addition, conflict resolution processes will be established for CLDs, related to their internal operation and decision making roles.

The Mai Ndombe REDD Project grievance process has been publicized to communities and a copy provided to the project validator. Two types of issues accounted for in the grievance process:

- Issues or conflict between the Community and ERA Congo

- Concerns regarding worker rights, work practices, and worker safety raised by ERA employees or contractors

Communities in the Mai Ndombe area are familiar with submitting grievances in written letter form or during community meetings (known as palapres). When grievances arise related to the project, complainants or their representatives are encouraged to initially raise issues or concerns informally with project or other local animateurs. On many occasions, these issues, complications, or grievances can be dealt with immediately, in which case they are noted and documented in the grievance binder in the project office in Inongo. Where concerns cannot be clarified and resolved at this level the grievance policy details a process for bringing concerns to project management.

Where a resolution is not achieved at the project management level or if the complaint is related to the ERA Congo Managing Director, Operations Manager or Project Manager a project related grievance will be directed to the DRC Forest Code regulated conflict resolution process under government decree, N.103/CAB/MIN/ECN-T/15/JEB/09. Under this decree, conflicts and grievances that arise within a forest concession will be resolved with a committee of the following members: The Territory Administrator, a territory supervisor from the Ministry of Environment, Conservation of Nature and Tourism, a representative from the concession holder, the forest industry sector, the Ministry of Land, the Ministry of Land Management and a representative from the party who submits the grief (Page 251, Article 7 of the DRC Forest Code). Mai Ndombe REDD project community members and stakeholders are made aware of the existence and availability of this process for resolution of project related concerns.

In the case that issues or grievances are raised by Mai Ndombe REDD project employees or contractors related to worker rights, work practices, or worker safety, the grievance policy details a similar process to the above, beginning with options to raise concerns informally with immediate managers, and up to the highest levels of project management.

The Mai Ndombe REDD Project's conflict and grievance resolution process will abide by the following principles when dealing with conflicts and grievances:

Responsiveness: complaints need to be resolved openly and responsively. It is expected that all written complaints will be acknowledged in writing within seven working days of their receipt in Inongo and resolved in a timely manner. The process and timeframes for resolution will vary depending on the nature, complexity and timing of the issue.

Fairness: the process will be fair to both the complainant and any person/s against whom the complaint is made. All parties must be protected from victimization, discrimination or retribution. The process shall be based upon principle that includes the complainant's right to be heard, have their complaint treated seriously, be informed of the processes of complaints handling and be informed of the decision and reasons for that decision. If the complaint involves the actions of a specific person or contractor associated with ERA that person shall have the right to be advised of the complaint, be informed of the processes of complaint handling, and be informed of the decision/action and reason for the decision/action.

Timeliness: ERA will attempt to resolve all reasonable grievances raised and provide a written response to grievances within 30 days.

Confidentiality: where appropriate, to protect confidentiality and privacy, staff involved in handling complaints resolution must ensure that information is restricted only to those who genuinely need to

know in order to deal with the complaint. Some information about the specific complaint may need to be disclosed to others during its resolution. The complainant needs to be informed of this.

G3.11. Project Financial Support

Demonstrate that financial mechanisms adopted, including projected revenues from emissions reductions and other sources, are likely to provide an adequate flow of funds for project implementation and to achieve the anticipated climate, community, and biodiversity benefits.

There is sufficient cash flow from contracted sales to sustain the project through the end of 2014. Documents supporting this assertion have been provided to the auditor.

G4. Management Capacity and Best Practices

G4.1. Project Proponent

Identify a single project proponent which is responsible for the project's design and implementation. If multiple organizations or individuals are involved in the project's development and implementation, the governance structure, roles, and responsibilities of each of the organizations or individuals involved must also be described.

The project proponent is ERA–WWC Joint Venture, a joint venture between ERA Ecosystem Restoration Associates Inc and Wildlife Works Carbon LLC. ERA Ecosystem Restoration Associates Inc is a wholly owned subsidiary of ERA Carbon Offsets Ltd, a publicly listed British Columbia corporation which trades on the TSX Venture exchange.

Wildlife Works Carbon LLC is a limited liability corporation registered in the State of Delaware with offices in Mill Valley, California.

The specific responsibility for operations of the Joint Venture lie with a steering committee composed of two members from ERA and two from WWC. These members will be updated periodically.

Operations in the DRC are conducted through ERA Congo SPRL, a company incorporated in the laws of the DRC and with a registered office in Kinshasa, DRC. ERA Congo SPRL is wholly owned by ERA Ecosystem Restoration Associates Inc; it holds contracts related to carbon rights within the project area as well as the two concessions in trust on behalf of the ERA–WWC Joint Venture.

G4.2. Key Technical Skills and Management Team Expertise

Document key technical skills that will be required to implement the project successfully, including community engagement, biodiversity assessment, and carbon measurement and monitoring skills. Document the management team's expertise and prior experience implementing land management projects at the scale of this project. If relevant experience is lacking, the proponents must either demonstrate how other organizations will be partnered with to support the project or have a recruitment strategy to fill the gaps.

Management Team Expertise: Project Steering Committee

Bart Simmons, B.AP Sc, MEng, Co-founder and Chief Operating Officer, ERA. Bart Simmons brings over 30 years of experience in restoring temperate forest ecosystems in British Columbia (BC), Canada. He is a recognized expert in forest regeneration, riparian ecosystem restorations, urban watershed restoration, biodiversity enhancement, wetland creation, and bioengineering. Bart has implemented riparian restoration projects on 15 watersheds within coastal BC and prescriptions on over 40 watersheds throughout BC, and he has overseen the planting of more than 100 million trees. Since 2005 ERA has been on the leading edge of carbon project origination; it has developed or co-developed innovative, award-winning forest projects that use carbon as a means for conservation and sold over 2 million tonnes of forest-based carbon offsets.

Mike Korchinsky, Founder and CEO, Wildlife Works. Mike Korchinsky is a serial entrepreneur with significant large-company management expertise. He has been a large-scale land owner of conservation lands for almost 15 years in Africa and Canada. He had a very successful business career prior to founding Wildlife Works. He has experience managing multimillion dollar projects all over the world; some of those projects had as many as 5,000 team members, and he has had to operate with profit and loss responsibility for all of those projects in addition to being a member of a US public company

executive team. Mike founded Wildlife Works in 1997, and it has come to be respected by many of the leading conservation groups in the world as a model for community-based conservation.

Rob Dodson, VP African Field Ops, Wildlife Works. Rob Dodson has more than 15 years of experience in managing various aspects of development projects in Africa, from building schools, tourism resorts, and production facilities to managing over 100 staff and interfacing directly with hundreds of community members on a regular basis. He speaks Swahili fluently and has gained the respect of administration officials at all levels of local and regional government in Kenya. He has been directly responsible for all aspects of land management of Wildlife Works' 74,490-acre Rukinga Ranch plus additional lands totalling another 5,000 acres that Wildlife Works manages for conservation for the owners of those lands. He has extensive knowledge of local and regional Kenyan biodiversity, and he is an honorary warden with the Kenya Wildlife Service.

John Block, BSc, Director of Operations, ERA. Prior to starting with ERA in 2008, most of John Block's working career was with the provincial government of BC, Canada. Positions he held during that time included Manager of Operations and Facility Development and Director, BC Parks and Protected Areas Branch; Senior Policy Advisor with the Green Economy Secretariat; and Director, Strategic Initiatives with the Ministry of Environment. He has a BSc in biology from the University of Victoria and did graduate studies in the Faculty of Forestry at the University of British Columbia. During his time with ERA, he has overseen the implementation and operation of all of its forest carbon offset projects, two of which have been validated under the CCB Standards. In addition to his role on the Project Steering Committee, John was involved in the preparation of the project CCB documents.

Management Team Expertise: Project Management

Jean-Robert Bwangoy-Bankanza, MSc. Project Director. Jean-Robert Bwangoy-Bankanza is a professional forester from the DRC. He is a teaching and research assistant at the University of Kinshasa, Agronomy Department, visiting scientist at USGS/Eros Data Center, and geospatial scientist at the South Dakota State University. Jean-Robert speaks French and holds a BSc in forestry from Université Laval, Québec, and a MSc in geographic information science from the University of Redlands, California. He is in the final stage of his research toward a PhD in geospatial science and engineering at the South Dakota State University, where he also works as a geospatial analyst. He has been working for more than 20 years with groups including the FAO/Forest Resources Assessment, University of Maryland at College Park, NASA Landsat Pathfinder Tropical Deforestation Project, Bowie State University, and the African Regional School for Integrated Forest and Land Management (ERAIFT) located at the University of Kinshasa. He is a Congolese national and has worked previously for timber-harvesting companies in the DRC. He is one of the world's leading experts in land cover and change analysis using remotely sensed data in the Congo Basin. As project director, he is based in Kinshasa and Inongo, DRC, while making regular trips to North America to link to ERA's and Wildlife Works' headquarters. Jean-Robert was instrumental along with John Kendall in conceiving this project.

Jennifer Holland, BA. Operations Manager and CCB project design document development co-lead. Jennifer Holland's lifelong passion for the environment and travel first drew her to ERA in 2009. In 2010 she oversaw the validation of ERA's CERP project plan to the Climate, Community, and Biodiversity Standard (CCBS), where ERA received the first CCBS gold-level project validation in Canada. Most recently, she oversaw the stakeholder engagement process for the ERA Denman Island ISO project plan and contributed to the Denman Island CCB PDD for validation. She has travelled extensively, both for work and pleasure, and in 2008 she volunteered overseas on a reforestation and community development project in Madagascar. She has a BA in environmental geography from Simon Fraser

University. As Operations Manager, she is based in Inongo, DRC, while making regular trips to North America to link to ERA's headquarters.

Professional and Technical Expertise: North America-Based Staff

Jeremy Freund, MA. CCB Climate Component Lead. With over 15 years' experience in the fields of satellite remote sensing and applied geography, Jeremy Freund brings broad technical skills to the project team. Possessing a BSc in aerospace engineering from the University of Colorado at Boulder, he specialized in satellite image processing with several years' experience working for prime US government contractors. He received his master's in Geography from the University of California, Santa Barbara, where he developed a crop monitoring/famine early warning system for the country of Kenya. He has spent several years working in applied natural resource science with emphasis on GIS/remote sensing for ecosystem services monitoring and forestry applications. He is the VP Carbon Development for Wildlife Works and his primary responsibilities involve management of AFOLU carbon accounting and project certification/verification. Jeremy had lead responsibility in providing the climate component of the CCB PDD.

John Kendall, BF, RPF. Contributor to the project CCB community component. John Kendall, who along with John-Robert Bwangoy-Bankanza originally conceived this project, has provided feedback to help shape the standards used to ensure the transparency, accuracy, equity, and additionality of forest carbon projects. He has a good working knowledge of the tools, methodologies, and standards used to regulate the forest carbon project offset sector. As a forester, his career has focused on enabling rural communities in Africa and the Americas to play an equitable, meaningful role in natural resource management. Over the last 21 years, he has developed technical skills and cultural awareness that allows him to more fully understand local needs and aspirations and the constraints and barriers that prevent communities from equitable participation in natural resource use. He has a forestry degree from Université Laval, Québec.

Rob Friberg, MA, RPF, Coordination of the PDD development; editing and input to document structure and content. Rob Friberg is a professional forester with more than 20 years' experience in forest management, community-based forestry initiatives, and forest carbon projects in Canada and Latin America. His collaborative approach and concern for local interests have consistently produced successful results for a wide range of projects. His recent involvement as the project manager for a pioneering forest carbon initiative was a key contribution to the success of the project, which was recognized with an award for innovation and excellence in the conservation of forest ecosystems on the west coast of British Columbia. He has a degree in forest resources management from the University of British Columbia, a Master's in environment and management from Royal Roads University, and certificates in tropical forest management from CATIE in Costa Rica.

Jane Boles, BA. Contributed to the initial conceptual stages of, and in the development and implementation of the stakeholder identification and engagement approach for, the project. Jane works with ERA's partners and project stakeholders in Africa to develop projects that enhance not only climate stability, but also whole ecosystem health, as well as rural livelihoods, forest governance capacity and biodiversity. Prior to starting with ERA, Jane worked in the governmental and non-profit sectors as a research analyst and educator on several forest governance and climate change initiatives in Central Africa and Canada.

Frédéric Jacquemont, MEL, DEA. Internal legal counsel in the preparation of the project legal agreements with the DRC government and contributor to legal and property rights components of the PDD. Frederic has wealth of experience in international carbon markets and environmental law. His international career spans 19 years as an environmental researcher, business consultant and legal

counsel for development agencies, environmental institutions and carbon offset development companies. Frédéric is an expert in international climate law, particularly the regulatory arrangements of the UN Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol and the Clean Development Mechanism (CDM)

Bryan Foster, PhD. CCB project design document input and site visit. Bryan Foster has over five years of professional expertise in forest carbon project development and auditing. He developed an ISO 14001 environmental management system for Jackson Hole Mountain Resort, worked as a technical specialist auditing forest carbon projects for Rainforest Alliance, and continues to work for EcoLogic's CarbonPlus program developing forest carbon projects in Mexico and Central America. He researched and wrote all of the documentation for EcoLogic's Bosques Pico Bonito, Honduras, reforestation project that received VCS validation in 2011. He is a recognized VCS AFOLU specialist and an accredited CAR verifier. He earned a master's degree in forest science from Yale University and a PhD in natural resources with a certificate in ecological economics from the University of Vermont.

Rosita Morandin, Senior Manager, Finance, ERA. With oversight of project financial management, Rosita Morandin manages ERA's accounting, finance, and human resources functions. She fell in love with accounting while working on her Bachelor of Business Administration at Capilano College. She continued her studies through the University of British Columbia and the Certified General Accountants Association of BC. She first gained experience at PricewaterhouseCoopers and then moved into the private sector helping various small businesses develop their accounting and human resource departments as they grew. She has become an expert in setting up control and reporting systems for small, fast-growing companies.

Professional and Technical Expertise: DRC-Based Staff

Henri Iyangwa Bokote, Managing Director, ERA Congo. Henri Iyangwa Bokote has worked with ERA Congo for the past year as a key facilitator with regards to the political and administrative authorities, the traditional chiefs, land chiefs, and local communities. Prior to his work with ERA, he worked for over 35 years with the Bralima brewery. He has a rich background in management, having spent many years as sales manager, site manager, and public relations manager. He has a degree in philology and linguistics from the University of Kinshasa.

Dodo Ndonda Kasongo, Technical Support/GIS, ERA Congo. Dodo Ndonda Kasongo studied as an agronomy engineer specializing in natural resource management, graduating from the University of Kinshasa. He has worked for ten years in the field of geomatics, and has been with ERA Congo for 1.5 years. During that time, he has been responsible for carrying out work on mapping, as well as processing and interpreting satellite imagery.

Anatole Bokolo, Technical Support/GIS, ERA Congo. Anatole Bokolo studied cellular biology at the University of Kisangani, after which he undertook GIS training at the digital cartography laboratory at the University of Kinshasa. He worked for 6 years for the logging company SODEFOR, where he worked in cartography, forest inventory, and statistics. He is GIS officer at ERA Congo where he oversees its inventory of plant and animal life and manages its financial records, store records, and other databases.

Donat Mboyo Koko, Logistics and Accounting, ERA Congo. Donat Mboyo Koko graduated as an agronomy engineer from the National Pedagogy University. After working as a teacher for four years, he was a researcher and section head in the Department of Ecology and Marine Biology at the Forest Ecology Research Center (CREF) of Mabali/Bikoro. His work as an accounts manager in the department for two years has led to his work with ERA Congo as a logistics and accounts officer.

Jose Bokaw Ikoko, Human Resources and Community Relations, ERA Congo. After studying commerce and administration, Jose Bokaw Ikoko got a diploma in business management from the Institut Supérieur de Commerce in Kinshasa. He has been working in human resources and administration for the last 25 years. At ERA Congo, he is responsible for human resources management, as well as supervising community relations in the project area.

DRC-Based Foresters

Nestor Demokolo Ndotdo, Forestry Engineer, ERA Congo. Nestor Demokolo Ndotdo trained as an engineering technician in agronomy. He has gathered a wealth of experience over two decades in forestry and agriculture and is now part of ERA's biomass inventory team.

Eddy Mbabila-Mangani, **Forestry Engineer, ERA Congo.** Eddy Mbabila-Mangani has worked in the forestry and agriculture sectors for over a decade. For the last year, he has been a part of ERA's biomass inventory team. He is also focusing on alternative income activities for local populations with agroforestry and crops for market.

Matthieu Bolaa Bokamba, Biodiversity Monitoring, ERA Congo. After graduating in biological science from the University of Kinshasa, Matthieu Bolaa Bokamba worked with the African Wildlife Foundation (AWF) for two years, where he was responsible for bonobo habituation and the monitoring of large mammals. At ERA Congo, his primary role is biodiversity monitoring of large mammals and the monitoring of human activity within the project area.

Thomas Lompese Bolingo, Biomass and Biodiversity Monitoring, ERA Congo. Thomas Lompese Bolingo is trained in natural resource management. He has worked for almost a decade with forestry companies dealing with their forest inventory and production worksites. As part of ERA's biomass inventory team he works in biodiversity monitoring.

Djems Mbalaka Ikeli, Forestry Engineer, ERA Congo. Djems has a diploma from the faculty of agronomy in Kisangani. He has worked managing forest ecosystems and as a forest engineer. Djems is now a senior member of ERA Congo's biomass inventory team.

Animateurs

The principal role of animateurs in the Mai Ndombe REDD project is carrying out community education and sensitization. There are ten animateurs, based in the concession area on average 3 weeks in a month. They have a pivotal role in disseminating information across the project area as well as reporting back to the head office regarding community issues. They are crucial in developing our understanding of community dynamics.

Marilyn Elembe, Animateur, ERA Congo. Marilyn Elembe studied economic and social law at the University of Kinshasa, graduating in 2009. After working as a researcher at L' Organisation Concertée des Ecologistes et Amis de la Nature (OCEAN) for 3 years, she came to ERA as an animateur.

Jerome Akili Lolonga, Animateur, ERA Congo. Jerome Akili Lolonga trained as a technician in rural development. Before coming to ERA Congo as an animateur, he worked with various NGOs in support of local communities in their development activities.

Jacques Ipoma Bongongo, Animateur, ERA Congo. After studying public law, Jacques Ipoma Bongongo was driven to support local communities and indigenous populations in the sustainable management of forests and biodiversity. Before coming to ERA Congo as an animateur, he worked with various NGOs, notably the African Wildlife Foundation (AWF).

Gratien Matungulu Mutiar, Animateur, ERA Congo. Following his graduation as an agronomist from the University of Kinshasa, Gratien Matungulu Mutiar worked for seven years as head of section in heveaculture (rubber production) at Blatnner. He is an agronomist animateur in charge of ERA Congo's alternative agriculture test plots.

Shako Okoka, Agroforestry Animateur, ERA Congo. Shako Okoka graduated from the University of Kinshasa as an agroforestry engineer, after which he worked as a consultant for World Wildlife Fund for five years. His work included planning and carrying out the inventory of large mammals, as well as being a supervisor on a bushmeat study on the impact of sale of wild animals and other forest products on endangered species. He was then a consultant in inventory management and forest management for two years before coming to ERA Congo as an animateur.

Gauthier Mindanda Kimpese, Animateur, ERA Congo. After obtaining his degree as an agronomy engineer from the University of Kinshasa, Gauthier Mindanda Kimpese became the project manager at Man and Biosphere in the Luki Biosphere Nature Reserve. He then worked as the environment and nature conservation coordinator at Kikwit. At ERA Congo, as well as community sensitization, he has worked on our socioeconomic study and is an alternative activity supervisor.

Ghuylain Nshangalume Nshoko, Animateur, ERA Congo. Guylain Nshangalume Nshoko studied as an agronomy and veterinary engineering technician at the Institut Supérieur des Sciences Agronomiques de Kinshasa (ISSA/Kinshasa). He then gained a degree in environmental science from the University of Kinshasa before working as an agronomy and veterinary consultant on farms for two years.

Evariste Loliki Biembe, Animateur, ERA Congo. Evariste Loliki Biembe graduated with a degree in biology from the National Pedagogy University and then went on to be a teacher for four years. Prior to his work as an animateur with ERA Congo, he was a researcher at the Centre for Research in Applied and Technological Sciences for a year.

North America-Based Project Consultants

Roy Gereau, MSc., Assistant Curator, Missouri Botanical Garden (MBG). Roy Gereau is Assistant Curator in the Africa and Madagascar Department, Missouri Botanical Garden, St. Louis, Missouri. He has conducted plant collecting and biological inventory work in seven countries on the African continent between 1984 and the present. He is a member of many professional organizations, including the Wildlife Conservation Society of Tanzania, Nature Kenya, and the IUCN Species Survival Commission – Eastern Africa Plant Red Listing Authority. He is also a member of the reviewer panel for the *African Journal of Ecology*. Among the many awards he has earned is "Ecosystem Distribution under Climate Change: The Role of Protected Areas for Sustainable Ecosystems" (Liz Claiborne Art Ortenberg Foundation, 2010). Roy is fluent in reading, writing, and conversation in English, French, Swahili, and Spanish. He has a BSc in forestry from Michigan Technological University and a MSc in biological sciences from Michigan State University. He is the author of 56 articles in peer-reviewed scientific journals, first author of *Lake Nyasa Climatic Region Floristic Checklist,* co-author of *Field Guide to the Moist Forest Trees of Tanzania*, and has published 48 scientific names of plants. Roy provided consulting services to the project through a contract between ERA–WW and the Missouri Botanical Garden to carry out botanical field inventory and provide supporting data and content for the biodiversity component of the CCB PDD.

Charlotte M. Taylor, BSc, MSc, PhD, Curator, Missouri Botanical Garden (MBG). Charlotte Taylor has close to 30 years' experience working in tropical plant ecology and floras, with a focus on the study of tropical areas and plant groups that are very poorly known to science. Her work is mainly focused in Central and South America, including collaboration on various tree plots, transect inventories, and RAP

assessment projects in Puerto Rico, Colombia, Ecuador, Peru, and Bolivia; she has also done field work and published studies of plants in Africa and Madagascar, and is developing a new approach to presenting flora information using web-based informatics. She has engaged in long-term collaborations with the Field Museum, New York Botanical Garden, National Botanic Garden of Belgium (the leader in study of the flora of Central Africa), and over a dozen botanical institutions in Mexico, Central America, and South America. She is also working with several graduate students in institutions in the US, Europe, and Brazil. She provided consulting services to the project through a contract between ERA–WW and the Missouri Botanical Garden to carry out botanical field inventory and provide supporting data and content for the biodiversity component of the CCB PDD.

Kyle Holland, BSF, MSF and Ben Caldwell, BA, MF, from Ecopartners, LLC. Ecopartners provided climate component related technical assistance in both methodological and project design document development. Ecopartners works with project developers, forest owners and verification bodies to build successful forest carbon offset projects. They provide assistance in such areas as project design and feasibility assessment, geospatial analysis, complex carbon accounting and capacity building for project implementation.

Africa-Based Project Consultants

Corneille Ewango, BSc, MSc, PhD, Head of Botanical and Forest Ecology Program, Wildlife Conservation Society (WCS)-DRC Program. Corneille Ewango has had a passion for study and conservation of the plants and animals of his native Congo Basin since he was a young man. He broke from his family's traditions and travelled far from his home to study at the university in Kisangani, where he took a position at Centre de Formation et de Recherche en Conservation Forestière (CEFRECOF) – Ituri Landscape, with its world heritage site in the Okapi Faunal Reserve. He later travelled even farther to get his Master's degree in the US and his doctorate in Europe. His dedication to conservation of the DRC's natural patrimony was literally tested by fire; he faced down not only poachers, squatters, and illegal miners but a rebel army that overran the reserve during the DRC's civil war. While the rest of the staff fled, he stayed behind to secure the natural history collections and data, and then barely escaped the region on foot; he returned and picked up conservation work as soon as the armies had left. This conservation leadership was critical for this region, and was recognized in his receiving the Goldman Environmental Prize in 2005. His overall conservation and ecological work made him an invited TED Global Conference speaker in 2007 and a National Geographic Emerging Explorer. He is now working at managing his project area, training additional Congolese conservationists, and helping to develop additional well-preserved natural areas in the DRC for long-term conservation. He provided consulting services to the project through a contract between ERA–WW and the Missouri Botanical Garden to carry out botanical field inventory and provide supporting data and content for the biodiversity component of the CCB PDD.

G4.3. Employee Orientation, Training, and Capacity Building

Include a plan to provide orientation and training for the project's employees and relevant people from the communities with an objective of building locally useful skills and knowledge to increase local participation in project implementation. These capacity building efforts should target a wide range of people in the communities, including minority and underrepresented groups. Identify how

training will be passed on to new workers when there is staff turnover, so that local capacity will not be lost.

Sourcing and developing local skills and knowledge is a key consideration in deciding on and implementing project activities. ERA Congo is legally registered with the National Institute for Professional Preparation that organizes training for employees, and will follow the INPP training schedules for employees. Project activities will be constructed in ways such that skills developed will be retained by the communities. The Mai Ndombe project recognizes hiring local employees as a priority. And, because local people are most familiar with the local geography, climate, and culture, their involvement ensures greater project sustainability. The Mai Ndombe project currently employs a significant number of local people (see section G4.4), including people from the local indigenous minority, and will continue with plans to hire and train people from this minority group.

Community and employee education and capacity building related to payment for ecosystem services, climate change, the carbon offset industry, measurements, and monitoring is ongoing and will continue in the form of meetings, workshops, and open discussion. Local foresters, for example, have been trained in methods for taking carbon measurements and field inventory for wildlife species. The Mai Ndombe REDD Project is collaborating with universities with regard to opportunities for forester training. Training will be is also provided to staff in Kinshasa in the areas of accounting, bookkeeping and general office procedures. Animateurs receive substantial training on processes for community engagement. One training event included project-funded travel to other areas of the DRC for workshops on alternative livelihood strategies. The types of training mentioned here will be ongoing and will therefore continue to benefit existing and future employees. Current animateurs and foresters as well as the project director and operations manager will provide training and project orientation for animateurs and foresters hired in the future as a result of staff turnover. As well, they will be partnered with experienced animateurs and foresters during the initial period of their employment.

The Mai Ndombe REDD Project will prepare Standard Operating Procedures or work plans for all project activities. They will be used to implement activities, guide training for new employees and be modified as management practices and activities are adapted. In a number of cases, particularly for activities that will be implemented in multiple locations or have detailed procedures to follow, detailed SOPs will be developed. Every new employee will be given adequate orientation and training according to these work plans and training SOPs.

At the national level, the Mai Ndombe project is helping to increase the availability of information related to flora and fauna and biodiversity (through inventory work in the project area) as well as GIS and spatial-analysis-related information.

G4.4. Equal Opportunity for Employment

Show that people from the communities will be given an equal opportunity to fill all employment positions (including management) if the job requirements are met. Project proponents must explain how employees will be selected for positions and where relevant, must indicate how local community members, including women and other potentially underrepresented groups, will be given a fair chance to fill positions for which they can be trained.

The Mai Ndombe REDD Project is committed to hiring based on the principle of equal opportunity and regardless of gender, race or religious belief. According to the Forest Code and its associated decrees,

when job candidates are equal in qualification, experience and test scores, local candidates will be given preference in filling positions. As well, the Social Chapter of the Terms of Reference to the Forest Conservation Concession Contract states, "the concessionaire is also committed to recruiting workers from the local community" (Article 16). In accordance with these requirements the Mai Ndombe project is committed to hiring local people whenever possible for all levels of unskilled, technical, and management positions. As of August 2012, 30 local people are employed full time in positions of all skill and pay levels, from boat drivers and construction workers to the managing director. The Mai Ndombe project is committed to training local employees and believes that this type of capacity building is an important asset to both the project and the community.

In addition to full-time employees, 30 local people from project area communities are hired to assist with forest inventory activities (up to 20 days per month). These people are developing skills in forest measurement and data recording. ERA employs 10 full-time animateurs (community engagement facilitators), three of whom are from the project area. In addition, these project animateurs train and utilize local animateurs in each village to assist them in their community consultation and engagement work. The project has hired 9 local animateurs from the communities of Selenge, Mbale, Inunu, and Bosongo.

In addition to training related directly to project responsibilities, the Mai Ndombe project is providing English lessons for some of the project employees in Kinshasa and those employees in Inongo who are interested in participating.

As the Mai Ndombe REDD project expands, employment needs will increase in the following areas:

- Management
- Construction
- Administration
- Monitoring
- Community Engagement

G4.5. Employment Laws

Submit a list of all relevant laws and regulations covering workers' rights in the host country. Describe how the project will inform workers about their rights. Provide assurance that the project meets or exceeds all applicable laws and/or regulations covering worker rights and, where relevant, demonstrate how compliance is achieved.

All employee rights and employer regulations and responsibilities in the DRC are covered by the *Code du Travaille*. This document has been made available to the project validators.

In keeping with the code du travaille, Mai Ndombe REDD has developed and received government approval for its own internal employee policy. This policy has been distributed among all employees and is presented and explained to prospective employees. All documents concerning the adherence to the above two policies are on file at the ERA offices in DRC.

G4.6. Employee Safety

Comprehensively assess situations and occupations that pose a substantial risk to worker safety. A plan must be in place to inform workers of risks and to explain how to minimize such risks. Where

worker safety cannot be guaranteed, project proponents must show how the risks will be minimized using best work practices.

The Mai Ndombe REDD project will ensure that workers' health and safety are protected to the best of the organization's ability at all times and all work sites. Health and safety risks will be identified, mitigation strategies for each risk will be disseminated to all workers, contingency plans will be developed, and the overall plans will be adapted in response to changing best-management practices and policies. The project will create a comprehensive safety plan (Mai Ndombe REDD Safety Plan) with input from local managers, staff, government officials, and communities. A combination of local knowledge and internationally recognized health and safety standards (Putz et al., 2012) will form the basis of risk identification and reduction. The goal of this plan is to provide a comprehensive set of management practices that reduce the risk of accidents and create a community whose health and well-being is improved at the work place.

The Mai Ndombe REDD Safety Plan will include the following topics and stipulations:

- General
    - Identification and development of mitigation strategies for health and safety risks.
    - Accident at work records shall be kept available and up to date.
    - ERA will not hire people under the age of 18 except when specific arrangements are made that comply with local law and community tradition.
    - ERA will appoint a qualified person to act as manager responsible for worker health and safety.
    - ERA will ensure that all employees and contractors have ongoing medical and financial support in the event of work place injury.

- Education and training
    - All workers will be adequately trained in safe working practices and receive copies of the safety plan. Subcontractors will be trained in the relevant sections of the safety plan.
    - Designated personnel will be trained in first aid.
    - Regular training sessions for current employees will be held to ensure that any changes to the plan are clearly communicated.
    - New employees will be given proper training on safety procedures prior to beginning employment.
    - All workers will be trained on the importance of proper use of safety equipment.
    - All workers will gain a practical knowledge of the legislation and/or national regulations on the health and safety of employees and their families.

- Equipment and Communication
    - First aid kits will be available in all work areas.
    - Appropriate safety gear will be required by all workers.
    - There will be a communication network to ensure that the employees on all work sites can remain in contact with supervisors or trained safety personnel.
    - Transportation of workers to their work site will be provided by means of transport that is regularly checked to guarantee worker safety.

- Health

- Managers will take measures to ensure adequate public health conditions (potable water, clean work sites, lavatories, etc.).
- Workers must pass medical examinations to ensure they are healthy enough to work.
- The project manager will take practical steps to supply his or her workers with food if required.

- Emergency Planning
  - Health care facilities with sufficient qualified medical personnel to provide emergency services will be located nearby.
  - There will be a written emergency management plan for dealing with any serious accident suffered by a forest worker or subcontractor to include rapid evacuation to a medical unit equipped with the appropriate equipment.
  - In the event of accidents at work, the project will be responsible for costs associated with the treatment and convalescence of the worker as per applicable legislation.

G4.7. Financial Health of Implementing Organizations

Document the financial health of the implementing organization(s) to demonstrate that financial resources budgeted will be adequate to implement the project.

The ERA–WWC Joint Venture between ERA Ecosystem Restoration Associates Inc and Wildlife Works Carbon LLC is sufficiently capitalized individually and severally through its joint venturers to implement the project.

ERA Ecosystem Restoration Associates Inc is a British Columbia (BC) corporation wholly owned by ERA Carbon Offsets Ltd, a publicly listed BC corporation with shares traded on the TSX Venture exchange. The company's largest shareholder is Forest Carbon Group AG, which holds 29.6% of issued shares. The Company has a board of directors of six members. The company is subject to corporate and securities law in BC and Canada and associated public reporting requirements.

ERA Carbon Offsets Ltd remains sufficiently capitalized to conduct operations through the revenue of ongoing sales contracts and is able to issue and sell common shares in the public markets.

Wildlife Works Carbon LLC is a Delaware-registered limited liability corporation in good standing whose largest member is Wildlife Works Inc, but which also counts Allianz Climate Solutions, AG, and PPR, the French sport and luxury lifestyle brand holding company, as members. Wildlife Works Inc is a California-registered US corporation and, as such, is governed by the corporation laws of California, which ensure that, at all times, the company remain financially solvent and able to meet its liabilities.

Wildlife Works Carbon LLC is owned by independent shareholders of good standing and has a board of directors (four at present, but likely to increase in number). WWC LLC is sufficiently capitalized to ensure completion of the project.

Please see section G3.11 for further details on project finance.

G5. Legal Status and Property Rights

G5.1. Compliance with Laws, Regulations, and International Agreements

Submit a list of all relevant national and local laws and regulations in the host country and all applicable international treaties and agreements. Provide assurance that the project will comply with these and, where relevant, demonstrate how compliance is achieved.

The Mai Ndombe project complies with all applicable local, district, and national laws, regulations, and standards. Within the project area, none of the proposed project activities violates any law. The DRC government owns the land in the project area and has granted permission to the project through award of the conservation concession. ERA Congo legally owns the rights to the sequestered carbon in the project area.

Laws Regulating the Forest Conservation Concession Contract and the Mai Ndombe REDD Project

Forest Code Loi n°011/2002, August 29, 2002 and its related implementation decree**, Decree n°11/27, May 20, 2011, concerning specific rules on the allocation of forestry conservation concessions,** determine the legal framework under which the forest conservation concession contract was allocated to ERA Congo.

Forest Code and its related Ministerial Order n°024/CAB/MIN/ECN-T/15/JEB/08, **August 7, 2008,** establishing a procedure for public enquiry prior to the granting of forest concessions. This procedure was followed by ERA Congo prior to the signature of the forest conservation concession contract.

Ministerial Order n°004/CAB/MIN/ECN-T/012 February 15, 2012, establishing an approval procedure for REDD+ projects**.** This procedure didn't apply at the time the Mai Ndombe REDD project was approved (see above). Nevertheless, some of these new dispositions apply to the project (Art. 21), such as:

- Register the REDD project to the DRC National REDD+ Registry (the Mai Ndombe project is registered).
- Notify the Registry of carbon transactions that have taken place under a standard recognized by the DRC and submit PDD and validation/verification reports on time.
- Submit a yearly progress report with audited financial statement at the latest by March 31 the year following the concerned financial year. This will apply for 2013.

Forest Code and its related Interministerial Order n°006/CAB/MIN/ECN-EF/2007 and n°004/CAB/MIN/FINANCES/2007 establishes the area tax and amount to be paid by forestry concession holders yearly. These taxes were paid in 2011 and 2012 by the Mai Ndombe REDD project.

Corporate Laws

Loi n° 10/008 February 27, 2010 modifying and supplementing the King Decree February 27, 1887, relative to commercial corporations and law **Loi n° 10/009, February 27, 2010,** modifying and supplementing the March 6, 1951, decree establishing a commercial and companies register. ERA Congo is registered to the new commercial and companies register under the registered number KM3087M.

Investments Code Loi n°004/2002 of February 21, 2002, establishes the legal and taxation framework for foreign investment in the DRC. It allows some tax exemptions to ERA Congo.

Labour Laws

Employment law "Loi n°015/2002" and its related **Ministerial Decree n°070/0016, August 11, 1970,** on working conditions; **Ministerial Decree n°68/13, May 1968,** relative to women's wages and working conditions; **Ministerial Order n° 12/CABMIN/TPS/AR/KF/059/02, Septembre 27, 2002**, determining implementing measures of Ministerial Order **n° 080/2002 July 3, 2002,** establishing a minimum wage**;** and **Ministerial Order n°12/CAB.MIN/116/2005, October 26, 2005,** relating to employee dismissal procedures. ERA Congo has adopted an internal employment conditions regulation in conformity with these labour regulations.

National Security Law Loi n°75/028 September 19, 1975, modifying **Decree-Law of June 29, 1961,** establishing the National Social Security Institute (INSS), covering employee pensions, occupational risks and accidents, and family allowances. Benefiting the members (employees/employers), it is a compulsory savings scheme into which the employer pays a statutory contribution for every employee who is a member. ERA Congo is being registered to the INSS.

Health Benefits Decree-Law 67/310 August 9, 1965, states that companies have to cover health care needs of their employees. This obligation is reflected in the internal employment regulation (Art. 51) of ERA Congo.

Local Laws

The **2006 Constitution of the Democratic Republic of the Congo** provides for the decentralization of powers from the central government to provinces, and forests rights are to be shared between the central government and the provinces (Art. 201).

Ministerial Decree n°11/27, May 20, 2011, concerning specific rules on the allocation of Forestry Conservation Concession (Art. 7) requires that the request be submitted to the provincial governor. Though not in force at the time of ERA's request, ERA Congo obtained an approval from the provincial governor and local authorities. This authority is given with the signing of the forest conservation concession contract terms of reference (cahier de charges) between the province, district, local communities, and ERA Congo on March 26, 2011.

Ministerial Decree n°033 October 2, 2006, concerning cadastre functioning and organization (Art. 2), requests that a copy of the concession contract be sent to the provincial cadastre. Two copies were sent by ERA Congo.

International Agreements

Article 215 of the **2006 Democratic Republic of Congo Constitution**, February 18, 2006, states: "Treaties and international agreements have regularly reached, from their publication, an authority superior to that of laws, provided for each treaty or agreement its implementation by other party."

DRC is party to the **United Nations Convention on Biological Diversity** since December 3, 1994, and signed its two related **Cartagena** and **Nagoya Protocols** on June 6, 2012, and September 9, 2011, respectively; party to the **United Nations Framework Convention on Climate Change** on January 9, 1995, and its related **Kyoto Protocol** March 23, 2005; to the **Ramsar Convention on Wetlands** on May 18, 1996, and party to the **Treaty on the Conservation and Sustainable Management of Forest Ecosystems in Central Africa and to Establish the Central Africa Forest Commission** (COMIFAC) on January 24, 2005.

The Mai Ndombe REDD project aims to assist the DRC with attaining its objectives in terms of climate change; the conservation of biodiversity, fauna, flora, and wetlands; and sustainable use of forest

ecosystems. The Mai Ndombe REDD project is within an area listed on September 9, 2008, as wetlands of international importance under the Ramsar Convention (also see Section G1.8).

Legal Agreements

Carbon Rights Agreement signed on March 14, 2011, between ERA Ecosystem Restoration Associates and the DRC government by its representative, the Minister of Environment, Conservation of Nature, and Tourism (MECNT). This agreement transfers the carbon rights to ERA, and states the roles and obligations of the two parties to that agreement, the project time period, revenue sharing with the government, payment to communities, and taxes to be paid by ERA to the government. In this case only, the area tax is to be paid; ERA is exempt from other taxes established by the Forestry Code.

Forest conservation concession contract signed on July 30, 2011, by ERA Congo and MECNT representatives, which allocates the conceded lands to ERA Congo and defines ERA Congo's social, environmental, and management obligations.

G5.2. Approval from Appropriate Authorities

Document that the project has approval from the appropriate authorities, including the established formal and/or traditional authorities customarily required by the communities.

The project has the approval from all appropriate authorities, including established formal and/or traditional authorities customarily required by the communities, as documented in the agreements listed here:

Signed with the Ministry of Environment, Conservation of Nature, and Tourism:

- Memorandum of understanding (Protocole d'entente) which assigns the carbon rights to ERA signed March 14, 2011, with ERA Ecosystem Restoration Associates Inc.
- Forest conservation concession contract (contrat de concession forestiere de conservation) signed July 30, 2011, with ERA Congo SPRL.

Signed with the Province, District, and Local Communities:

- Forest conservation concession contract terms of reference (cahier de charges) signed March 26, 2011. Includes:
    - Provisional land management plan (plan de gestion du territoire).
    - Social chapter (clause sociale).

Signed with Traditional Seats of Authority in Project Area:

- Community consent forms signed with the clan[18] shown below in Table G5.1.

[18] It should be noted that consent forms were alternatively signed in the name of the clan, village, or forest.

Table G5.1 Signatories of community consent forms.

	Clan	Villages	Forest
01	Ipokyetoyi	Lobeke	**Lobeke**
02	Ikoli	Mpete	**Iba**
03	Basanza	Bopambo	**Bopambo**
04	Mpama	Mpatambalu	**Mpatambalu**
05	Bomwanza	Kesenge	**Bomwanza**
06	Mpama	Ibali	**Ibali, lonka**
07	Botongambela	Nselenge	**–**
08	Lobalu	Lobalu	**Lobalu**
09	Bongo	Bongo	**Bongo**
10	Boliombale	Ngeleko	**Ngeleko**
11	Boondo II	Ntandenyanga	**Boondo**
12	Mpenge basake	Mpenge	**Bokondompenge**
13	Mbongo	Bosoli 1	**Bosoli**
14	Ndomandala	Bosoli 2	**Bosoli**
15	Basobe	Ilee	**Ilembusia**
16	Nyatotonga	Mbale	**Mbale**
17	Mpototonga	Lokanga	**–**
18	Ngelibenga	Ibenga	**Ngelibenga**
19	Bangaya	Kesenge	**Bangaya ikula**
20	mpama	Kesenge nghaa	**Nghaa**
21	Bompengo	Mekiri	**Itono, bomboko**
22	Bokolo II	Kundo	**Bokonda bontale**
23	**Bopombo**	**Itebe**	**Ikon**

G5.3. Non-Encroachment

Demonstrate with documented consultations and agreements that the project will not encroach uninvited on private property, community property, or government property and has obtained the free, prior, and informed consent of those whose rights will be affected by the project.

The project will not encroach uninvited on private property, community property, or government property. The land in the project area is owned by the governments of the DRC and the province of Bandundu. The project has been granted the managements rights for both concessions by the Ministry of the Environment, Conservation of Nature, and Tourism (MECNT) and the province of Bandundu, as further described in sections G1.6, G3.8, G5.1, G5.2, and G5.6.

Communities in the project area govern resource use and access through customary laws and rights managed by local chiefs. ERA has adopted a multiphased approach to stakeholder engagement and consent which includes communication of important project information to stakeholders as it becomes available, and allows stakeholders to impact project design, air grievances, and give or withhold free prior and informed consent (FPIC) to participation in project activities. This multiphased stakeholder engagement and consent process is designed to continue throughout the project lifetime. Documented consultations are described under each phase listed below. Further details of these phases are provided in section G3.8. Dates, attendees, topics, and often photos of significant community meetings are available for review in the Mai Ndombe project offices.

Initial Consultations

Information sessions were held in each of the 23 major villages in the project area. In these meetings ERA Congo was introduced, including its history and the concept of REDD, with a discussion of global climate change. Meetings typically lasted between 2 and 6 hours and were attended by between 20 and 100 adults. Villagers were encouraged to ask questions of ERA Congo and continued to discuss the project in community wide, traditionally held, palabres. After visiting the community a few times, would introduce a consent form and encourage stakeholders to debate the merits of consenting to project development without the company present. After at least two days had elapsed, ERA returned to each village to answer further questions, continue with information sharing, and collect consent forms if they had been signed. Consent forms were signed in 100% of communities where they were proposed. Further discussion of this process can be found in section G3.8.

Negotiation of the Terms of Reference

The terms of reference (cahier de charges) were undertaken in order to obtain agreement with local authorities on a land management plan and the project's basic socioeconomic activities, as defined by the communities. The outcomes of these consultations include the land management plan and the social chapter. These consultations form the basis of first-year project activities.

Local Development Committee (CLD) Building Process

The Mai Ndombe project has hired 10 animateurs to work with communities to explain the project and potential activities as well as potential benefits. Local development committees (CLDs) are formed as a requirement of MECNT and will establish a structure where project benefits will be democratically distributed, and development activities will be planned in a participatory way for each village. CLDs are formed by way of a (to date, very well attended) community wide election in which the candidates are elected for individual positions within the CLD. Each candidate must inform the villages what merits they feel they have in order to complete the job and as well must be native and permanent resident of the village. Those elected generally represent various functioning groups in the community and thus are felt to be good representatives of the community as a whole.

The CLDs will decide to what extent they would like to engage in the project or if they would like to ultimately opt out of project activities. Minutes, attendance, and photographs for all major CLD meetings are held on file at the project office in Inongo. The development of CLDs was facilitated by the Mai Ndombe REDD project, however, the functioning of the CLD is not limited to ERA activities.

G5.4. Involuntary Relocation of People or Important Activities

Demonstrate that the project does not require the involuntary relocation of people or of the activities important for the livelihoods and culture of the communities. If any relocation of habitation or activities is undertaken within the terms of an agreement, the project proponents must demonstrate that the agreement was made with the free, prior, and informed consent of those concerned and includes provisions for just and fair compensation.

No involuntary relocations will be carried out in the implementation of the project within the project area or the project zone.

G5.5. Illegal Activities that Could Affect the Project's CCB Impacts

Identify any illegal activities that could affect the project's climate, community, or biodiversity impacts (e.g., logging) taking place in the project zone and describe how the project will help to reduce these activities so that project benefits are not derived from illegal activities.

Illegal activities in this sense are the destruction of biodiversity (illegal killing of animals or destruction of vegetation cover) beyond the conditions permitted by law. The Forest Code defines the "local community forest." Agriculture activities are permitted in this area and, therefore, deforestation or forest degradation for agriculture and/or customary activities (i.e., fuelwood for local consumption) in these areas is not illegal. As the local community forest boundaries are not yet defined due to lack of a national forest management plan, the Forest Code and its related implementation decrees and rules prescribe a participatory mapping procedure to be carried out by the concession contract holder and local communities under the framework of their CLDs. In fact, the Forest Code states that "the Concession Holder has all the rights pertaining to the forest use and conservation except the usage rights of the local communities."

Land usage within the conservation concession area, other than for local communities and other types of concessions (such as agriculture or forestry) awarded prior to the signing of the concession contract is not permitted. These concessions have therefore been subtracted from the project area. Such concessions exist in three different areas: two concessions in the Bosongo and Mbwenzey forest, one concession in the Mbale forest at Bobola Mpinga, and a 25 square km agricultural rubber plantation in the triangle between Kesenge, Mpili, and Kesenge. At Bobola Mpinga, logging activities have been happening that have supplied the project with material for school construction.

Hunting is illegal only during periods of hunting closure. Hunting using traditional methods is not viewed as illegal at any time as it does not significantly contribute to the depletion of animal populations.

G5.6. Clear, Uncontested Title to Carbon Rights

Demonstrate that the project proponents have clear, uncontested title to the carbon rights, or provide legal documentation demonstrating that the project is undertaken on behalf of the carbon owners with their full consent. Where local or national conditions preclude clear title to the carbon rights at the time of validation against the Standards, the project proponents must provide evidence that their ownership of carbon rights is likely to be established before they enter into any transactions concerning the project's carbon assets.

ERA holds clear and uncontested rights to the carbon credits generated in the project area. Under Congolese law, the state owns all land and water including subsoil minerals and is the default owner of carbon rights as well. While the transfer or easement of carbon rights was not contemplated in any previously established Congolese law, ERA became the first private entity to have such rights transferred in March 2011 with the signing of a carbon rights agreement with MECNT.

The assignment of carbon rights section in the memorandum of understanding (MOU) between ERA and MECNT was drafted by a Canadian legal team and vetted by the legal counsel of MECNT. It was based on a template used by ERA in previous forest carbon projects signed between ERA and Canadian government bodies, such as the Community Ecosystem Restoration Program (see http://eraecosystems.com/projects/project_types/ar/) validated to ISO 14064-2 and CCBA. The MOU acknowledges MECNT's rights to carbon and makes explicit the transfer of that right to ERA at the moment the carbon credit is generated through project activities. The MOU details a legal agreement between ERA, MECNT, and local stakeholders, whereby, in exchange for the rights to generate and sell

carbon credits, ERA pays an annual area tax and a profit share to MECNT, as well as a portion of carbon revenues to local stakeholders.

The acknowledgement of ERA's rights to carbon credits generated in the project area was further entrenched with the signing of the forest conservation concession contract between MECNT and ERA Congo (ERA's Congolese subsidiary) in July 2011. The forest conservation concession contract is a MECNT-drafted document, adapted from contracts signed between MECNT and timber harvesters to suit the particular circumstances of a REDD project proponent. In addition to outlining ERA's rights and responsibilities related to the management of the project concession as a conservation area, the state explicitly guarantees ERA full enjoyment of rights guaranteed under the MOU, including exclusive rights to sell carbon credits generated in the project (see Art. 4 of the concession contract).

CLIMATE SECTION

CL1. Net Positive Climate Impacts

CL1.1. Net Change in Carbon Stocks Due to Project Activities

Estimate the net change in carbon stocks due to the project activities using the methods of calculation, formulae and default values of the IPCC 2006 GL for AFOLU or a more robust methodology.

The procedure used for calculating GHG emission reductions is the modelling of an increasing level of deforestation and associated carbon loss in the baseline scenario and comparing it to a stable non-deforested level of carbon retention in the project scenario. Following the VM0009 methodology, the net GHG emissions reductions have been calculated as shown in Table CL1.1.

Table CL1.1 Projected without-project emissions and net annual change.

Monitoring Period	Date of Monitoring	Estimated baseline emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
1	10/31/12	3,398,286	2,548,715
2	10/31/13	2,819,006	2,114,255
3	10/31/14	3,529,795	2,647,346
4	10/31/15	4,330,794	3,248,096
5	10/31/16	5,279,073	4,201,266
6	10/31/17	6,273,185	4,704,889
7	10/31/18	7,429,948	5,572,461
8	10/31/19	8,524,210	6,393,158
9	10/31/20	9,642,568	7,231,926
10	10/31/21	10,724,028	8,817,407
11	10/31/22	11,486,467	8,614,850
12	10/31/23	12,156,738	9,117,553
13	10/31/24	12,377,577	9,283,183
14	10/31/25	12,683,678	9,512,758
15	10/31/26	13,011,345	11,304,342
16	10/31/27	11,833,474	8,875,106
17	10/31/28	11,439,490	8,579,617
18	10/31/29	10,448,018	7,836,014
19	10/31/30	10,047,330	7,535,497
20	10/31/31	9,413,412	9,270,665
21	10/31/32	7,067,767	5,300,825
22	10/31/33	7,093,658	5,320,243
23	10/31/34	7,062,984	5,297,238
24	10/31/35	5,577,002	4,182,751
25	10/31/36	3,839,613	5,473,328
26	10/31/37	3,567,731	2,675,798
27	10/31/38	3,341,502	2,506,127
28	10/31/39	3,101,996	2,326,497
29	10/31/40	2,978,211	2,233,659
30	10/31/41	443,874	3,094,440
	Total	**220,922,762**	**175,820,011**

CL1.2. Net Change in Emissions of Non-CO_2 GHGs Such as CH_4 and N_2O

Estimate the net change in the emissions of non-CO_2 GHG emissions such as CH_4 and N_2O in the with and without project scenarios if those gases are likely to account for more than a 5% increase or decrease (in terms of CO_2-equivalent) of the project's overall GHG emissions reductions or removals over each monitoring period.

Emissions from non-CO_2 GHG are conservatively excluded from the GHG accounting.

CL1.3. Other GHG Emissions Resulting from Project Activities

Estimate any other GHG emissions resulting from project activities. Emissions sources include, but are not limited to, emissions from biomass burning during site preparation, emissions from fossil fuel combustion, direct emissions from the use of synthetic fertilizers, and emissions from the decomposition of N-fixing species.

Emissions from project activities are de minimis and are not included in the overall GHG accounting.

CL1.4. Demonstration of Positive Net Climate Impact

Demonstrate that the net climate impact of the project is positive. The net climate impact of the project is the net change in carbon stocks plus net change in non-CO_2 GHGs where appropriate minus any other GHG emissions resulting from project activities minus any likely project-related unmitigated negative offsite climate impacts.

Table CL1.1 above demonstrates a net positive climate impact of **175,820,011** tonnes CO_2e over the 30-year project period.

CL1.5. Avoidance of Double Counting

Specify how double counting of GHG emissions reductions or removals will be avoided, particularly for offsets sold on the voluntary market and generated in a country with an emissions cap.

The Mai Ndombe project is being developed under VCS, which requires that all carbon credits (VCUs) generated by the project are listed on a third-party registry and are tracked from the time of initial verification to retirement. Unique serial numbers will be generated for each tonne of CO_2 that is sequestered under this protocol and no credits will be allowed to be sold more than once. This project area will not be involved in any other projects developed under another voluntary or regulatory carbon offset protocol.

CL2. Offsite Climate Impacts (Leakage)

CL2.1. Leakage

Determine the types of leakage that are expected and estimate potential offsite increases in GHGs (increases in emissions or decreases in sequestration) due to project activities. Where relevant, define and justify where leakage is most likely to take place.

Leakage is quantified using an activity-shifting leakage area(s) and a market-effects leakage area, which may or may not overlap with the reference area. Like the reference area, the activity-shifting leakage area is defined by the agents and drivers of deforestation for each identified baseline type in the baseline scenario. However, unlike the reference area, the activity-shifting leakage area is also defined by proximity to the project area and anticipated directional shifts in deforestation activities. The activity-shifting leakage area is more purposeful than a belt or an arbitrary buffer around the project area. The market-effects leakage area is defined when long-lived wood products exist in the baseline scenario to estimate leakage resulting from a change in supply of domestic long-lived wood products as a result of illegal or legal-sanctioned logging.

Activity-Shifting Leakage

Activity-shifting leakage is not applicable to this project. In the context of the project's baseline scenario, activity-shifting leakage would apply to the secondary agents of deforestation – members of communities located within or near the project area – and the extent to which there are alternative, accessible forested areas within the range of their mobility.

Without access to the project area that would have been provided by logging infrastructure, it is possible that secondary agents could be displaced to other forested areas within the range of their mobility (up to 25 km per section 2.4.1 of the Mai Ndombe REDD VCS project document). However, such forested areas do not exist within this range of mobility. The region already has experienced significant deforestation and conversion to agricultural land use. In other words, the project area represents the last remaining forest that is accessible to the secondary agents living within or near the project area. Because there is no forested area (except for the project area) that is accessible to the secondary agents within the range of their mobility, these agents are unable to shift their deforestation activity to nearby forests, and therefore activity-shifting leakage would not occur. Cumulative emissions from activity-shifting leakage are set to zero for carbon accounting purposes.

Market-Effects Leakage

Under the Baseline scenario P1 - applicable to this project - market leakage does not apply when the primary agent is known, and the project proponent has demonstrated that there is no possibility for that agent to be awarded a further/replacement concession within the national boundary. The primary agent, SOFORMA, holds historical concessions far in excess of the DRC legal maximum concession holdings, and therefore is deemed ineligible for a replacement legal concession award. Cumulative emissions from market-effects leakage are therefore set to zero for carbon accounting purposes.

CL2.2. Leakage Mitigation Activities

Document how any leakage will be mitigated and estimate the extent to which such impacts will be reduced by these mitigation activities.

As there is no expected market or activity shifting leakage we do not foresee the need for specific mitigation activities to reduce leakage.

CL2.3. Subtraction of Unmitigated Leakage from the Climate Benefits

Subtract any likely project-related unmitigated negative offsite climate impacts from the climate benefits being claimed by the project and demonstrate that this has been included in the evaluation of net climate impact of the project (as calculated in CL1.4).

As there is no leakage anticipated, subtraction of unmitigated leakage from the climate benefits is not applicable.

CL2.4. Non-CO_2 Gases

Non-CO_2 gases must be included if they are likely to account for more than a 5% increase or decrease (in terms of CO_2-equivalent) of the net change calculations (above) of the project's overall off-site GHG emissions reductions or removals over each monitoring period.

Emissions from non-CO_2 GHG are de minimis and are not included in the GHG accounting.

CL3. Climate Impact Monitoring

CL3.1. Carbon Pool Monitoring

Develop an initial plan for selecting carbon pools and non-CO_2 GHGs to be monitored, and determine the frequency of monitoring.

The objective of the monitoring plan is to ensure accurate estimates of carbon stocks and emissions reductions from the project. The monitoring plan is meant as a guide to maintain consistency during monitoring, and also includes training and internal audit procedures for quality control. It is meant as a working document to be revised as needed during the course of the project. When revisions are necessary they will be noted as monitoring deviations in the subsequent monitoring report prepared for VCS verification events. The monitoring plan will include three continual monitoring activities listed in Table CL3.1. More detail on the nature of, methods for and specific timing of these activities will be included in the final monitoring plan.

Table CL3.1 Anticipated monitoring activities.

Activity	Frequency	Method
Forest patrols and perimeter observation	Semiannually at minimum	Patrol team inspects perimeter of project area
Plot measurements	Annually	Sampling teams visit a portion of plots in project and proxy areas
Identification of significant disturbance	Once every 2–3 years or after major disturbance event	Periodic inspection of aerial imagery or videography, with ground inspection when necessary

Forest Patrols and Perimeter Observation

Forest patrols are intended to monitor, detect, and prevent unauthorized activities within the project area. Such activities may include unauthorized timber harvest and other activities prohibited by the terms of the conservation concession held by the project proponent.

Forest patrols shall consist primarily of members of local communities, especially members of an organization of hunters, based in Mbale, whose members possess expert knowledge of the land and who have performed biodiversity monitoring in the region. Teams will be allocated to ensure an adequate level of experience in each patrol team.

Training for patrols will be provided by the National Institute for Nature Conservation (ICCN) and will be carried out locally in the project area. The project proponent shall be involved in the training to ensure that patrol members receive adequate training.

Plot Measurement and Monumentation

Biomass and soil sampling shall be conducted according to the Forest Measurement Protocol (available in the Mai Ndombe VCS Monitoring Report's Annex H). The Protocol was written to ensure standard procedures for care and consistency during data collection. Inventory plots were randomly allocated in the project area. A total of 463 plots were allocated for monitoring in the Project Area. Measurements in

the proxy area also employed a simple random sample. The measurement protocol was identical to the one employed in the project area.

Plot centres were recorded using a global positioning system (GPS) and marked in the ground with rebar. Permanent plots with a 15 m radius were used, with a nested circular sampling design of 15 m for the upper canopy and 5 m radius for understory vegetation. Species, genus, and dbh are recorded for trees greater than 10 cm dbh. For the inner radius, all species of understory vegetation are recorded.

Soil sampling includes measurements of soil organic carbon (SOC) and bulk density. Soil organic carbon is measured by extracting a soil core to a depth of 30 cm. Bulk density is collected by digging one pit and extracting two samples, one above and one below 15 cm depth.

Each team receives extensive instruction regarding proper field protocol, use of field instruments, and sampling methodology. All plots are measured during the first monitoring period and subsequently remeasured every five years. Each year 20% of plots will be randomly sampled without replacement.

Identification of Disturbances

Ground reconnaissance, inventory plots and periodic analysis of available imagery will be used to quickly identify disturbances in the project area resulting from natural events (e.g., fires) or encroachment. Imagery products may include Landsat, MODIS, FEWS NET, GoogleEarth, or aerial imagery/videography collected by the project proponent. Where necessary this information will be supplemented with ground-based monitoring.

A disturbance shall be significant if:

- the disturbed area is greater than 250 ha, OR
- the disturbance results in a decrease in carbon stock estimates (tCO_2e/ha) of greater than 5%. The magnitude of the change in carbon stocks shall be determined by comparing the carbon stock estimates of the disturbed area's stratum prior to disturbance with the results of a pilot sample of approximately 5 plots in the disturbed area.

If a disturbance is determined to be significant, a new stratum will be delineated for the disturbed area using GPS or a remote sensing product. Plots will be installed for remeasurement of above- and below-ground biomass, and project area carbon stocks recalculated.

Data Collection, Storage, and Aggregation

Field data shall be recorded according to methods detailed in the final monitoring plan. The data shall be reviewed for accuracy and adherence to procedures. Once error checks are complete, the workbook shall be used to aggregate data into a master list of tree (and other biomass) and soil measurements, and to designate the appropriate allometric equation to each tree measured.

This database, as well as original field logs, will be maintained in Inongo. Copies of both will be kept in the main office in Kinshasa. In addition, Wildlife Works will maintain a copy of the most recent database at their office in the United States.

CL3.2. Full Monitoring Plan

Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

A full monitoring plan will be developed within twelve months of validation against the Standards and made publicly available on the internet as well as communicated to the communities and other stakeholders.

COMMUNITY SECTION

CM1. Net Positive Community Impacts

CM1.1. Estimated Impacts on Communities from Project Activities

Use appropriate methodologies to estimate the impacts on communities, including all constituent socio-economic or cultural groups such as indigenous peoples (defined in G1), resulting from planned project activities.

Community Involvement with Determining Desirable Impacts

The Mai Ndombe REDD project has been interacting with communities living within and adjacent to the project area since early 2010. The initial consultations, negotiation of the terms of reference (cahier de charges), participatory rural appraisal processes, and local development committee (CLD) building process described in G3.8 and G5.3 have included all socioeconomic and cultural groups in the project area, as well as those who live outside, but have usufruct rights within, the area. This contact and community consultation has been central to characterizing the present socioeconomic situation, baseline tendencies, and expected impacts due to project activities.

During implementation of the initial community consent process described in section G3.8, the project proponents met with communities to describe the project proposal and explain that local communities would be included as partners in the project. The nature of payments based on the sale of carbon credits for community development projects was also described.

During the cahier de charges process in early 2011, multiple rounds of community consultations took place in which communities discussed options for compensation under the proposed REDD+ project (see section G3.8 for further discussion). After extensive public consultations, this negotiation process culminated in the development of a clause sociale (social chapter), which was revised, agreed to, and signed by representatives from most of the 23 communities. It laid out plans for key activities identified as important to project area communities. The project has already moved forward to fulfill a number of obligations contained in the clause sociale before validation/verification.

Future project activities will be decided through participatory processes managed by the local development committees (CLDs) and community-wide evaluations of the outcomes and impacts of potential activities. The project will also use community-wide evaluations and the results of monitoring activities to incorporate new and updated project activities, using an adaptive management approach (G3.8). Planned project activities and future activities undergoing additional investigation and consultation are described in section G3.2.

The participatory rural appraisal (PRA) process undertaken in communities to date was designed to identify baseline conditions in the project area and to identify ecosystem services and resources that are important and essential to each community's well-being and survival. Key resources identified during the PRA were water, fuel and building wood, arable land for agriculture, and a wide array of other non-timber forest products. The Mai Ndombe REDD project has used the theory of change diagrams illustrated in Figures CM1.1 through CM1.3 to help determine whether long-term impacts of project activities are aligned with the community's assessment of important ecosystems services and priorities for well-being.

Estimation of Expected Net-Positive Impacts

The theory of change method, also known as the causal model, was chosen to estimate the impacts of project activities on the community. Richards and Panfil (2011) recommend this approach above other

known methods as a credible and cost-effective means of assessing community and biodiversity impacts for REDD projects. The theory of change process provides a structured, cause-and-effects-oriented approach to estimating how project activities result in specific outputs, which lead in turn to outcomes and subsequent long-term impacts. In addition to the benefits from using a logical, structured approach, the causal model allows indicators to be developed from each of the outputs and outcomes depicted, enabling a measurement of progress toward longer-term impacts (Olander & Ebeling, 2010; Richards & Panfil, 2010). This is particularly helpful where direct measurement of long-term impacts is difficult.

The models for each of the community-related project activity areas developed using the theory-of-change method are shown below. The model developed for Activity Area 1, climate and ecosystem conservation activities, can be found in section B1.1.

Each figure below depicts the cause and effect relationship between specific project activities defined to date, their anticipated resulting outputs and outcomes, and expected short-, medium-, and long-term impacts. Inherent to the theory of change approach is a series of assumptions about how each step along the output-to-impact chain will actually result in the anticipated changes. Many of the causal relationship assumptions are well established in the literature or from other projects, and therefore there is limited risk of being incorrect. In the discussions below, we have identified areas where there is potentially more significant risk associated with the accuracy of the assumptions. A benefit of the theory of change approach is the ability to select monitoring indicators for intermediate steps in the change process (e.g., outcomes and short- to medium-term impacts) in order to test if the theories of change are correct and project activities have resulted in the anticipated trajectory of net positive benefits for communities.

As with any project (including REDD projects) that has impacts on communities and their surrounding environment, there is a possibility that negative and/or unforeseen impacts may occur. CCBA-related guidance recommends that the potential for negative project impacts be assessed (Richards & Panfil, 2011), that mitigation actions be developed where necessary, and that measures for monitoring potential negative impacts be included within monitoring programs. The Mai Ndombe project team reviewed the full range of potential negative community impacts arising from REDD projects (Richards, 2011; Richards & Panfil, 2011). These impacts center around five themes: reduced availability of land for agricultural activities and associated reduction to food supply/increased costs for food; reduced availability of timber and non-timber forest products; inequitable distribution of project benefits and/or workloads, with resulting conflict; disruption to traditional social or governance structures; and impacts from surrounding areas, such as increased migration to the project area.

The Mai Ndombe project design incorporates measures to minimize the risk of negative impacts occurring. The community forest zone buffers, for example (see section B1 Biodiversity) establish forested zones which surround each community and are excluded from the project quantification area. This ensures a continued availability of land from which to continue the extraction of traditional forest products as well as related agricultural and cultural activities. In addition, agricultural demonstration and intensification activities under Activity Area 3 aim to compensate for any future pressure for agricultural lands. These activities in fact are intended to result in a greater, more diverse, and more reliable supply of agricultural products than what was previously available in the baseline scenario. Additional agricultural activities are underway or in the planning stage that will improve available protein supplies. These activities will mitigate any reduced access to bushmeat supplies from activities related to the monitoring and increased administration of hunting. As with agricultural intensification noted above, these activities are intended to result in a greater and more sustainable supply of local protein compared to what is available under baseline conditions.

Other potential negative impacts, such as the inequitable distribution of project benefits, will be addressed through the participatory decision-making processes of established CLDs. Equity of benefits among gender, age, social, and economic status groups is a core value for the project, and continued assessment of equitable distribution will form a component of the project's monitoring activities. The process for decision making and management of project benefits aligns with mandated local planning structures in the DRC and will incorporate traditional elements of tribal-based governance. Those on the project team who are very familiar with the project area and the communities it supports are of the opinion that issues related to in-migration to the area or zone to take advantage of project benefits is not a significant risk due to the non-transitory and tribal nature of local populations (Bankanza, Kendall, personal communications, 2012).

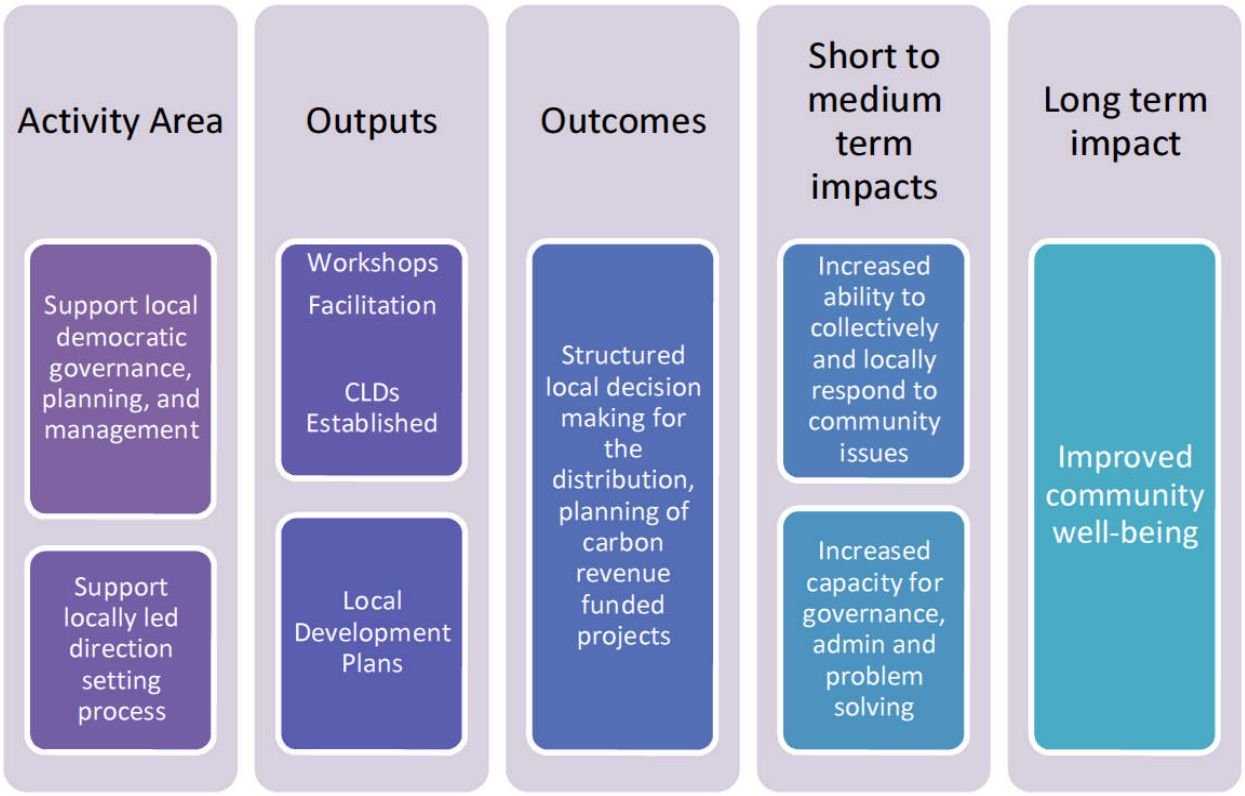
In addition to the above project design elements and to monitoring related to the occurrence of potential negative impacts, monitoring activities will include open discussions with local communities to help ascertain the occurrence of any unforeseen impacts.

Activity Area 2: Community Capacity Building and Social Capital

Activities under the theme of community capacity building and social capital, as shown below in Figure CM1.1, involve building the local capacities of communities through workshops and information sessions, the establishment of CLDs, and the creation and execution of local development plans. The tangible, measurable outputs for these activities will include completed training activities, establishment of CLDs in each village, and the completion of local development plans. The Mai Ndombe REDD project expects that outcomes and short-term impacts resulting from these outputs will include increased local knowledge and skills with respect to participatory, democratic decision making and management-oriented processes related to community development. Short- and medium-term impacts resulting from this increase in knowledge and skills include the communities' ability to collectively and locally respond to community issues, and an increased local capacity for governance, administration, and problem solving. Ultimately, as these skills are developed, assisted, and enhanced, the long-term result will be improved community well-being.

Among the assumptions made in this theory of change analysis is that the formation and training of committees to manage community decision making should lead to increased community capacity, ability, and motivation to collectively respond to local issues, as well as to plan for and manage inclusive community development initiatives aimed at improving local well-being. While such cause and effect relationships seem reasonable and are commonly employed within contemporary, empowerment-focused community development work, the project's monitoring activities will include a confirmation of these expected results at various stages of the cause and effect chain, to verify its validity.

Figure CM1.1 Theory of Change Model for Community Capacity Building and Social Capital

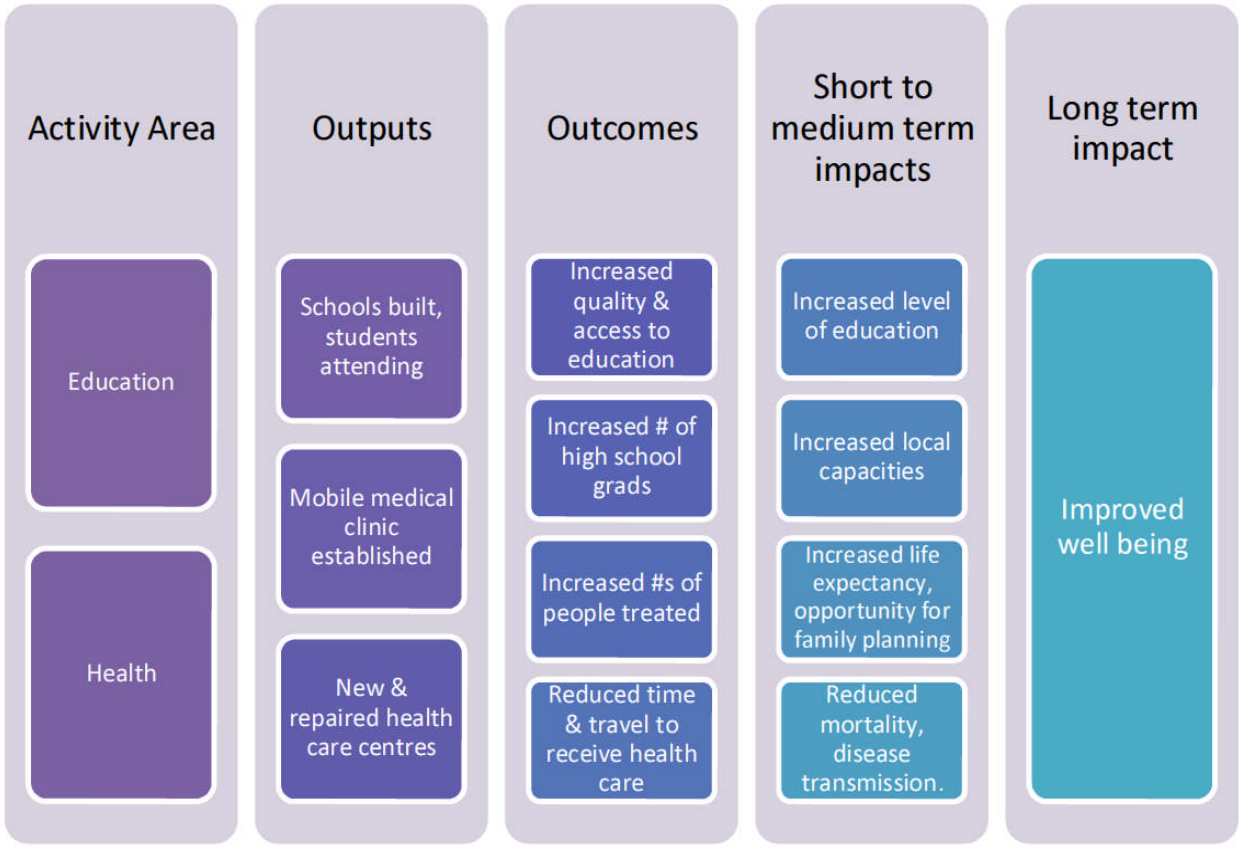


Activity Area 3: Infrastructure Development and Education, Health

The Mai Ndombe REDD project's four activities defined to date in this activity area are expected to have the following short-term outputs: schools built in project area communities; students attending these new schools; the establishment of a mobile medical clinic; and new and repaired health care centres and hospitals. Both health and education infrastructure development have been identified by the communities as high-priority focal areas for project activities. These infrastructure developments are expected, over the longer term, to increase the quality and accessibility of health and education. Accessibility of both education and health are key project outcomes as project activities will increase the numbers of students who have access to schools and who will graduate; more people will have access to timely medical care, rather than walking many kilometres for care or reverting to non-medically proven remedies. The expected short- to medium-term impacts of these outcomes are increased level of education and health, and, subsequently, increased local capacities and increased life expectancy. Ultimately, the long-term result of these activities is estimated to be improved community well-being.

An important assumption in the cause and effect relationships for this activity area is that the construction of schools will necessarily increase education levels, for example, that students will be interested and willing to attend the schools and that qualified teachers we be available. Early consultation with communities leaves no doubt that there is a high level of interest and need for the new schools. The Mai Ndombe project monitoring program will assess the achievement of education outcomes to ascertain whether the additional change theories related to this activity area are valid, and/or what changes in approach or activities may be required to improve results.

Figure CM1.2 Theory of Change Model for Infrastructure Development and Education, Health



Activity Area 4: Agricultural Improvement, Diversification, and Economic Opportunities

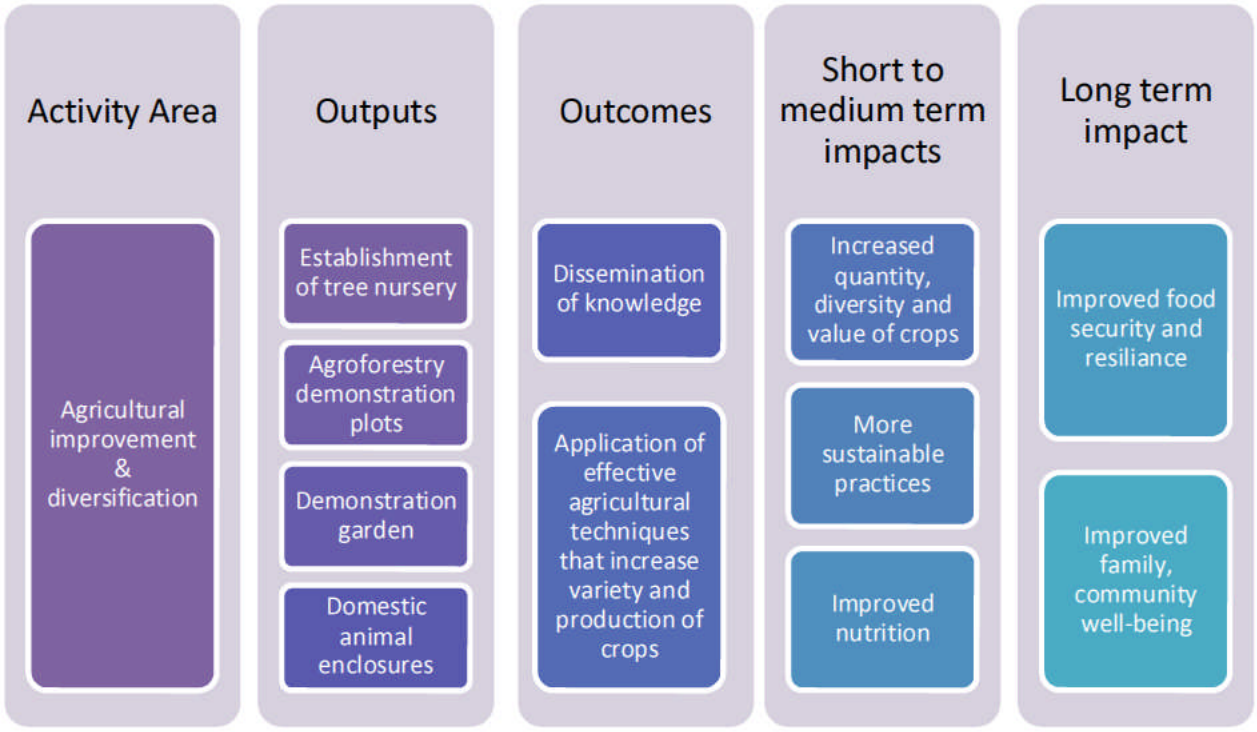
Agricultural improvement and diversification activities that increase food availability and sustain economies were identified as a key focal area by project area communities during initial consultations and CLD-building workshops. Tangible and measurable short-term outputs are the establishment of a tree nursery, agroforestry, and agriculture demonstration plots and the construction of domestic animal enclosures. The expected outcomes resulting from these outputs are the dissemination of effective agricultural techniques and other knowledge. These outcomes are intended to subsequently lead to impacts of increased quantity, diversification, and value of crops for market. As well, agricultural techniques are expected to become more sustainable and the nutritional value of harvests is expected to improve. Ultimately, these activities are estimated to have the long-term impacts of improved food security and resilience for communities, which will improve family and community well-being.

A key assumption in these casual relationships is that demonstration projects and the dissemination of improved agricultural techniques will result in changes to techniques that are currently being practiced. For this reason, a key measure of success will be the application of these improved techniques by the farmers themselves and their subsequent success in providing intended positive results.

In addition to the agricultural economic activities described above, the Mai Ndombe project recognizes the importance of fostering sustainable job creation within and beyond the project lifetime. Currently the project employs 66 people, 30 of whom are from the project zone. In addition, as many as 45 workers are hired on a daily basis to undertake various labour and logistical activities. Potential project

activities for job creation are listed in section G3.2 and additional activities will be vetted and implemented after validation.

Figure CM1.3 Theory of Change Model for Agricultural Improvement, Diversification, and Economic Opportunities



Comparison of With-Project to Without-Project Socioeconomic Well-Being

A comparison of with-project to without-project social and economic well-being is presented below. It is organized around the three focal issue areas identified in section G2.4. These focal issues reflect what the communities have identified as overriding areas of importance and concern with respect to their well-being, and are therefore the most relevant themes around which to base such a comparison.

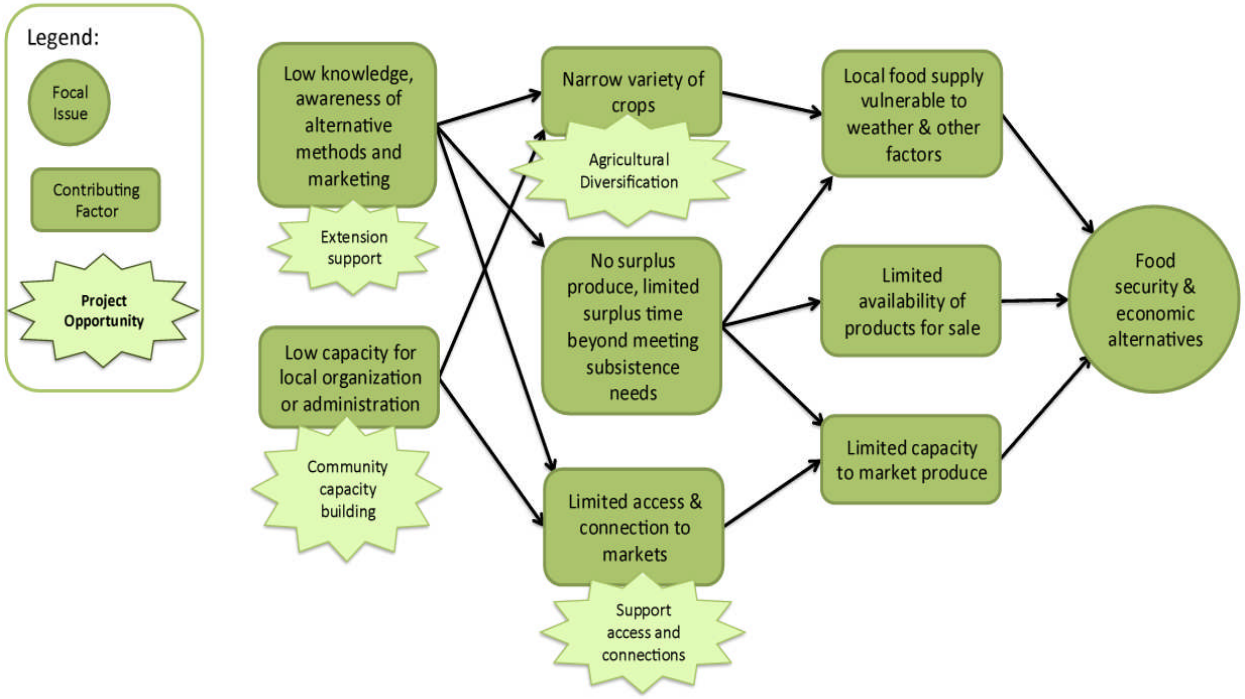
Food Security and Economic Alternatives

As illustrated in Figure CM1.4, there are significant, ongoing influences which, in the without-project or baseline scenario, limit the ability of local communities to improve their socioeconomic well-being. With no other community development initiatives of any significance currently taking place or expected to take place in the project zone in the foreseeable future, it is expected, as identified in section G2.4, that current baseline conditions will continue or become worse. In fact, the unsustainable use of local natural resources under a logging concession in the baseline scenario is expected to lead to a "cascade of drivers." This will eventually lead to a non-forested state and associated depletion of natural resources, including availability of fertile soil for agriculture, which will negatively impact food security and the ability to develop economic alternatives.

With regard to the with-project scenario, however, Figure CM1.4 also illustrates specific points within the local socioeconomic and environmental context where Mai Ndombe project activities are intended to intervene and produce the positive momentum and change described in the theory of change

models. That is, according to the cause and effect relationships demonstrated in the theory of change model, agriculture diversification will contribute to a reversal of unsustainable trends and result in a greater, more reliable supply of food for local sustenance and export to nearby markets. Efforts to assist with commercialization will help to provide alternative economic alternatives, and capacity building in the areas of local organizational and administrative abilities will help ensure that these benefits continue well beyond the life of the project. Monitoring will confirm the project's ability to achieve these positive impacts and provide information for adjusting activities and approaches over time to ensure these results are achieved.

Figure CM1.4. Problem Flow and Project Opportunity Points for Food Security and Economic Alternatives



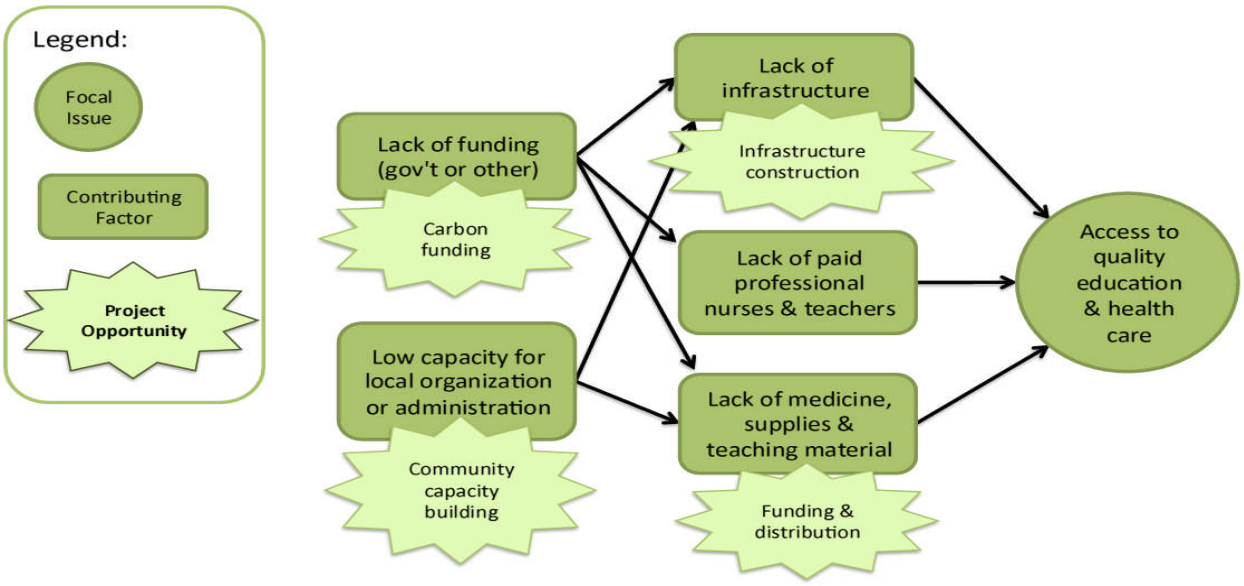
Access to Quality Education and Health Care

Again, as illustrated in the problem flow diagram in Figure CM1.5, which outlines the access to quality education and health care focal issue, significant ongoing influences limit the possibility for improvement in the without-project scenario. There is little to no evidence that the major factors influencing these conditions will change in the immediate or foreseeable future. In addition, the current health and education infrastructure is in such a degraded state it is unlikely that there will be additional support over the coming years, beyond that currently available in the without-project scenario, that would come anywhere near being able to meet the needs of the communities within the project.

In the with-project scenario, however, Figure CM1.5 illustrates where carbon funding for infrastructure development and local capacity in governance and administration will provide much-needed support for improving access to quality education and health care. This with-project scenario is demonstrated through the theory of change models above for Activity Areas 2 (capacity building and social capital) and 3 (infrastructure development and education, health). That is, according to the cause and effect relationships, infrastructure development, supported by an increase in local planning and management capacity, will lead to improved access to quality education and health care. Monitoring will confirm the

project's ability to achieve these positive impacts and provide information for adjusting activities and approaches over time to ensure that positive results are achieved.

Figure CM1.5 Problem Flow and Project Opportunity Points for Access to Quality Education and Health Care

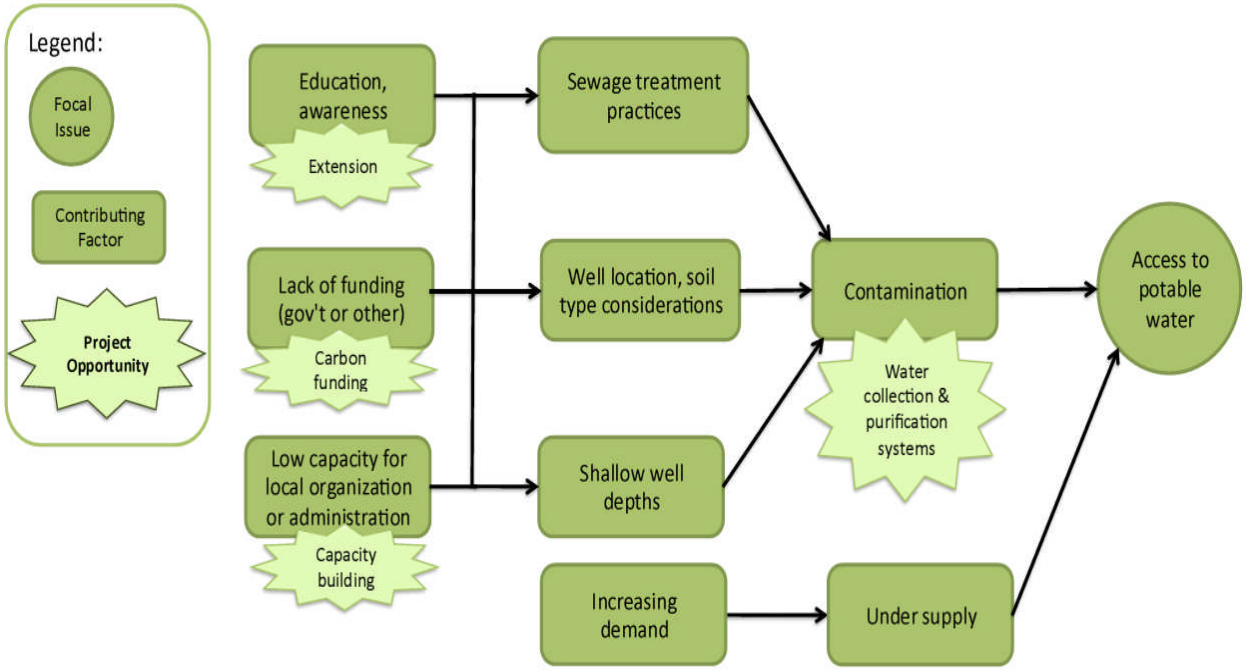


Access to Potable Water

Problem flow diagram Figure CM1.6, this time for the access to potable water, underlines the factors currently viewed as obstacles to achieving improvements to this area in the without-project scenario. As with the health and education and food security issues discussed above, there is little to no evidence of ongoing initiatives that might improve community well-being in this area in the immediate or foreseeable future.

Figure CM1.6 shows potential opportunity points that the Mai Ndombe REDD project is currently investigating to determine the most effective manner through which access to potable water can be achieved. Funding available through the sale of the project's carbon offsets has made such consultation efforts (both with communities and local technical experts) possible. The results of this explorative process will identify key areas where project activities can be most effective in improving conditions related to potable water. Follow-up monitoring will confirm the project's ability to improve the supply of potable water and provide information for adjusting activities and approaches over time to ensure that positive results are achieved in the most effective way possible.

Figure CM1.6 Problem Flow and Project Opportunity Points for Access to Potable Water



CM1.2. Demonstration of No Negative Effects on HCVs G1.8.4–6

Demonstrate that no high conservation values identified in G1.8.4–6 will be negatively affected by the project.

HCV G1.8.4. Areas that provide basic ecosystem services in critical situations

HCVs under this category include forests critical to water catchments (ecological interconnectedness and protection of the high-priority Lake Mai Ndombe freshwater designated area, and the Tumba-Ngiri-Mai Ndombe wetland) and barriers to destructive fire (drying microclimate and increasing tropical forest fire frequency and severity).

Protection of forests through conversion of the land-use concession from unsustainable logging to protected status inherently provides significantly positive effects on these high conservation values. No related negative effects are anticipated as a result of the project.

HCV G1.8.5 Areas that are fundamental to meeting the basic needs of local communities

HCVs under this category are fish habitats dependent on the health of forest-riparian-supported spawning areas; non-timber forest products, including insects, grub worms, caterpillars, and honey; shifting cultivation practices that depend on the presence of sufficient area of intact forest as a source of fertile soil; saps, leaves, and other tree components as a source of medicinal ingredients; and supplies of wood for cooking, and vines and poles as raw materials for building and crafts.

Protection of forests through conversion of the land-use concession from unsustainable logging to protected status inherently provides significantly positive effects for these high conservation values by ensuring the protection of the ecosystems that support them. Ability to access forests for the utilization

of non-timber forest products will continue as before. No related negative effects are anticipated as a result of the project.

G1.8.6. Areas that are critical for the traditional cultural identity of communities

HCVs in this category are sacred sites within the project zone's forests, including burial and spiritual sites as well as non-timber forest products frequently used for artistic and traditional purposes, and local worldview and creation stories which are strongly related to the landscape.

Protection of forests through conversion of the land-use concession from unsustainable logging to protected status inherently provides an increased level of protection for these HCVs compared to the baseline. To ensure their protection, the project will not result in the disclosure of locations of spiritual sites. Consultation with local chiefs will take place with regard to any proposed development activities, such as infrastructure construction, to ensure that these sites are not affected. No related negative effects are anticipated as a result of the project.

The Mai Ndombe REDD project will monitor for negative impacts on HCVs. With respect to spiritual sites, as their locations remain known to chiefs only, chiefs will be involved in monitoring their protection.

CM2. Offsite Stakeholder Impacts

CM2.1. Potential Negative Impacts on Offsite Stakeholders[19]

Identify any potential negative offsite stakeholder impacts that the project activities are likely to cause.

The Mai Ndombe project team reviewed the range of potential negative community impact themes identified by Richards and Panfil (2011) and discussed in section CM1.1. Using these impact themes as a guideline, the project estimates that project activities will, at the very least, do no harm to offsite stakeholders as project activities are designed to positively impact stakeholders both within and outside the project area. However, the project has identified the following potential offsite stakeholder impacts:

- Change in volume of resources extracted from the project area that may result in reduced employment or access to these resources outside of the project area.
- Competition due to increased quality and/or quantity of agricultural products exported from the project area.

CM2.2. Mitigation of Negative Impacts on Offsite Stakeholders

Describe how the project plans to mitigate these negative offsite social and economic impacts.

Change in Volume and Availability of Extracted Resources

In the baseline scenario, timber extracted through legal logging activities was exported out of the country as raw logs; therefore, a reduction in local income generated from the processing of this resource is not expected. However, the without-project scenario is reported to have employed up to 200 people during logging activities, and at least half of those employed are reported to have been from outside the project area. Future project activities that focus on agricultural improvements and sustainable job creation are expected to offset this negative impact by increasing export and trade of agricultural and other products. In addition, the project has already hired over 66 full-time and 30 casual employees to undertake project operations, and these positions and activities have their own positive multiplier effects.

The hunting and sale of bushmeat from the project area is expected to decrease due to project activities. This decrease may indirectly impact intermediate traders. However, the reduction in this resource will be offset by the increase in production of other sources of protein and agriculture in the project area that are exported and sold out of the project area.

Employment associated with both loggingand bushmeat in the baseline scenario is not expected to be sustainable even into the near future as merchantable timber resources from the project area will not be replenished and the supply of bushmeat continues to decline due to overhunting and habitat loss.

Increased Competition in Marketable Produce

Communities which produce and market products similar to those of communities in the project area may be impacted by an increase in quantity and or quality of products, specifically agricultural products, in the project area. However, agricultural intensification and diversification activities are applicable outside the project area and therefore may also benefit offsite stakeholders. In addition, potential

[19] That is, the main groups potentially affected by the project activities who are not living on or adjacent to the project site.

commercialization activities are planned so that any surplus produce will be shipped to outside markets, such as Kinshasa; thus they will not compete with local markets and this impact is not expected to be significant.

CM2.3. Demonstration of No Net Negative Impacts on Other Stakeholder Groups

Demonstrate that the project is not likely to result in net negative impacts on the well-being of other stakeholder groups.

As described in sections CM2.1 and CM2.2 the project will have minimal negative impact on offsite stakeholders. Potential negative impacts center on a reduction in revenues due to reduced resource extraction, and potential market competition due to increases in agricultural activities and exports. These impacts are expected to be mitigated by focused project activities in both of these areas. Therefore, no net negative impacts on other stakeholder groups are expected due to project activities.

CM3. Community Impact Monitoring

CM3.1. Community Monitoring

Develop an initial plan for selecting community variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's community development objectives and to anticipated impacts (positive and negative).

The selection of community variables to be monitored will be chosen using the theory of change method described in section CM1.1. As described above, a benefit of the theory of change approach is the ability to select monitoring indicators for intermediate steps in the change process (e.g., outcomes and short- to medium-term impacts) in order to test whether the theories of change are correct and project activities are resulting in the anticipated trajectory of net positive benefits for communities. As project monitoring and reporting continues in subsequent years, community input from the CLDs and other project stakeholders will be incorporated into the monitoring plan to insure that project objectives, activities, and their expected impacts are being achieved and monitored appropriately.

Community impact monitoring will be undertaken during each verification period, which is expected to occur annually.

CM3.2. HCV Monitoring

Develop an initial plan for how they will assess the effectiveness of measures used to maintain or enhance high conservation values related to community well-being (G1.8.4–6) present in the project zone.

The high conservation values discussed in section CM1.2 above are expected to be positively impacted by the conversion of the concession from logging to conservation. No negative impacts are anticipated as long as the concession continues to be managed as a conservation concession; therefore, no additional monitoring outside of this allocation is needed.

Areas that are critical for the traditional cultural identity of communities (see section G1.8) are inherently protected due to the cessation of logging activities; however, each year as project monitoring takes place the project will survey chiefs to ensure there are no negative impacts on this HCV.

CM3.3. Full Monitoring Plan

Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

The Mai Ndombe project will disseminate the monitoring plan and the results of the monitoring within 12 months of validation. These documents will be made publically available on the internet and communicated to the communities and other stakeholders.

BIODIVERSITY SECTION

B1. Net Positive Biodiversity Impacts

B1.1. Changes in Biodiversity

Use appropriate methodologies to estimate changes in biodiversity as a result of the project in the project zone and in the project lifetime. This estimate must be based on clearly defined and defendable assumptions. The with-project scenario should then be compared with the baseline without-project biodiversity scenario completed in G2. The difference (i.e., the net biodiversity benefit) must be positive.

As with estimation of changes to socioeconomic well-being as outlined in section CM1.1, changes to biodiversity as a result of the project have been estimated using the theory of change method, also known as the *causal* model. The theory of change process provides a structured, cause-and-effects-oriented approach to estimating how project activities result in specific outputs, which lead in turn to outcomes and subsequent long-term impacts.

The theory of change model for biodiversity-related project activities is shown below in Figure B1.1. The model depicts the cause and effect relationship between project activities defined to date, their anticipated resulting outputs and outcomes, and expected short-, medium-, and long-term impacts. A degree of overlap exists between activities and impacts focused toward socioeconomic-related objectives (see CM1.1) and those focused toward biodiversity (e.g., capacity building, agricultural alternatives that reduce extraction-related pressures on forests). These overlaps are discussed where appropriate.

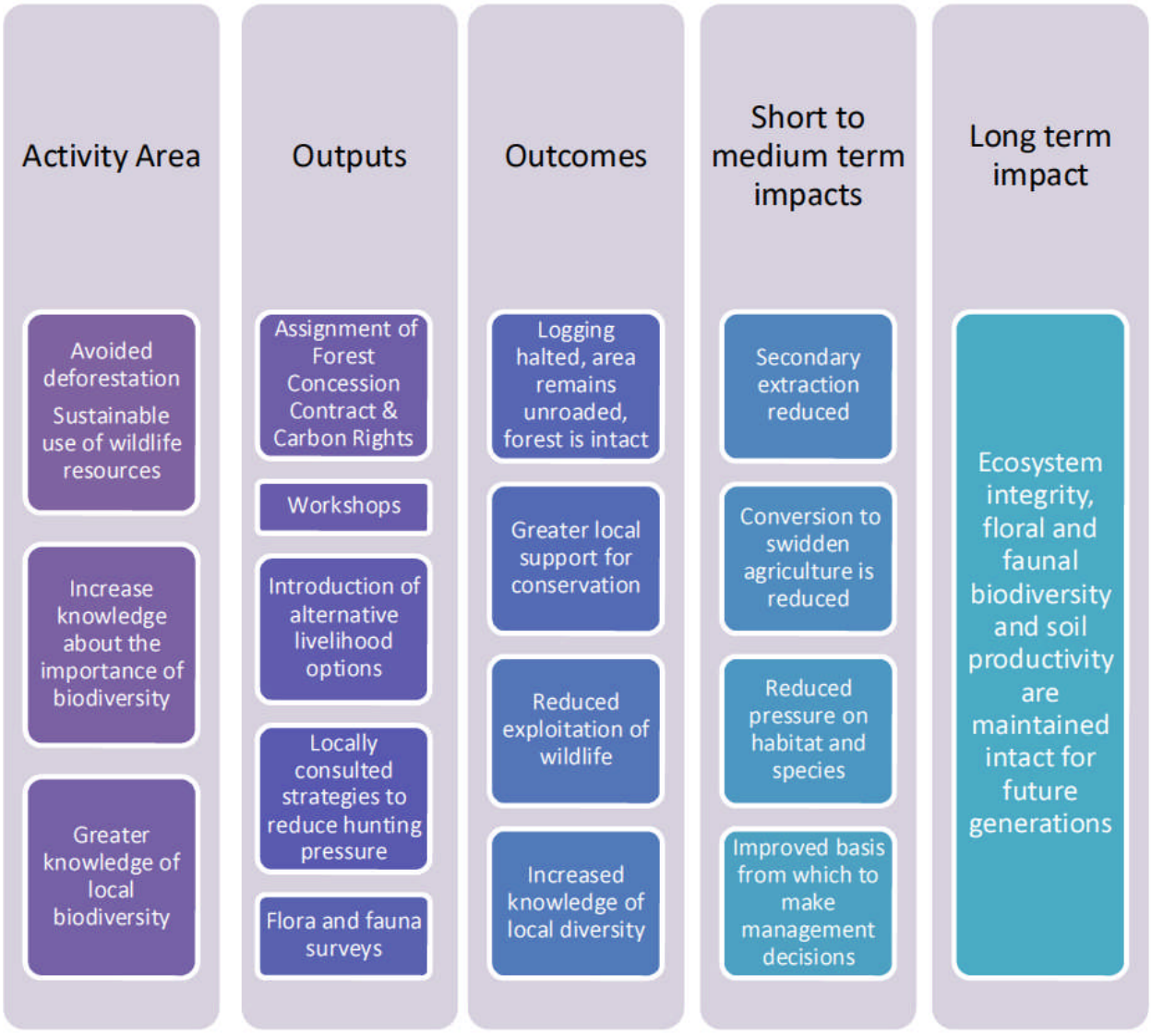
As with any REDD project there is a possibility that negative, and/or unforeseen impacts from project activities may occur. The Mai Ndombe project team reviewed the full range of potential negative impacts arising from REDD projects (Richards, 2011; Richards & Panfil, 2011). These impacts are generally related to negative changes in socioeconomic conditions, for example, reduced availability of land for agricultural activities and reduced availability of timber and non-timber forest products (see full discussion in section CM1.1). Due to the Mai Ndombe project's conservation focus, there will be limited if any net negative changes to biodiversity that result from project activities. Monitoring activities will nonetheless assess for the occurrence of potential negative or unforeseen impacts to biodiversity.

The theory of change model for Activity Area 1, climate and biodiversity activities, focuses on activities that have been fully defined at this point in the project. Due to the project's 30-year lifetime, additional activities will continue to be defined and determined through the CLD consultation process (see section CM1.1). Examples of these activities are listed in section G3.2. Some, such as the monitoring and administration of certain types of hunting activities, have been considered at length already but await further community consultation. Other activities are undergoing early phases of investigation. A theory of change or other change estimation method will be developed through discussions with communities for future activities which come to fruition. The results of these will be presented in future project implementation reports.

The first activity depicted in Figure B.1 is conversion of the land-use concessions in the project area from a logging focus to a conservation focus. Immediate outputs for this activity (concession contract and carbon rights agreement) are already complete. The immediate outcome of these project outputs, as shown in the change model, is the avoidance of industrial-scale roading and timber extraction from the project area, that is, the forest remains intact. The short- to medium-term impact or result of this outcome is the avoidance of subsequent secondary wood product extraction (charcoal, local building supplies, and firewood) due largely to the lack of access which would have been created through industrial-scale road building and timber extraction. An increase in hunting pressure which would have

resulted from road building in the without-project scenario is also avoided. Additionally, permanent conversion to non-forest land (and associated loss of soils and soil productivity) through swidden agriculture is prevented, again via reduced road access compared to the without-project scenario, and avoidance of the initial clearing of large timber, associated with the industrial logging phase. This cause and effect sequence is discussed in more detail in the Mai Ndombe VCS project document and the climate sections of this document. Potential risks to the achievement of the biodiversity benefits arising from this activity are expected to be relatively minor and are discussed in section G3.5. They relate to the potential for incursion of logging activities from existing minor tenures, from the edges of secondary forests and along existing roads and water ways. Solutions for mitigating these potential risks include activities detailed under Activity Area 4: Agricultural Improvement, Diversification, and Economic Opportunities.

Figure B.1 Theory of Change Model for Climate and Ecosystem Conservation Related Activities



The second project activity in Figure B.1, reduced unsustainable extraction of wildlife resources, is described in section G3.2 as an activity currently under development as more consultation with

communities and stakeholders, particularly with hunters themselves, is scheduled to take place before these activities are precisely defined. They are anticipated to involve the provision of livelihood opportunities, such as the monitoring of biodiversity elements as alternatives to unsustainable hunting. Additional alternative livelihood elements are discussed in section G3.2 under Activity Area 4: Agricultural Improvement, Diversification, and Economic Opportunities. The cause and effect sequence, or theory of change, related to this activity in Figure B.1 shows how the introduction of alternative livelihoods leads to an outcome of reduced demand for, and reduced extraction of, wildlife species, and the eventual impact of reduced pressure on species populations.

The third activity in Figure B.1 is educational efforts to increase knowledge about the importance of biodiversity. As shown in the project's theory of change, it is anticipated that this activity, defined via outputs of educational workshops and materials, will eventually lead to outcomes of increased community engagement and support for biodiversity conservation and will eventually contribute to impacts of reduced pressure on habitat, connectivity, and species.

The fourth activity under biodiversity and climate is the collection of data to increase knowledge of local plant and animal biodiversity. The subsequent effects of increased knowledge and basis from which to form management decisions are self evident.

Long-term impacts in Figure B1.1 define anticipated changes over the project lifetime as compared to the without-project scenario. These are ecosystem integrity, floral and faunal biodiversity, and soil productivity maintained intact for future generations.

Comparison of With-Project to Without-Project Biodiversity Scenarios

As described in section G2.5, in the without-project scenario for biodiversity, that is, in the absence of active protection, most of the primary terra firma forest in the project area will be logged over the 25-year period of the timber concession. The initial logging will lead to a well known and documented sequence of events: secondary extraction of forest resources (charcoal, fuelwood, local construction materials, NTFP, bushmeat) due to increased access; swidden agriculture leading to a permanently deforested state; and irreversible degradation of soil productivity due to both loss of forest cover and unsustainable agricultural practices. The expected results of this sequence with respect to biodiversity and ecosystem integrity are forest fragmentation (i.e., a loss of landscape connectivity); a decrease in or extinction of species; drying of micro-habitat; loss of habitat; invasion by secondary species; loss of ground cover plants, understory animals, and soil microorganisms; erosion through reduced ground cover and increased direct rainfall; loss of soil nutrients; and sedimentation of wetlands. This cause and effect chain is exacerbated by expanding human populations and poor economic conditions in the area.

In the project scenario, however, this sequence of unsustainable and destructive events is avoided. As described above, industrial logging operations are prevented, and secondary exploitation and agricultural conversion are avoided, thereby protecting the ecological integrity of the area at the landscape scale.

B1.2. No Negative Effects on HCVs

Demonstrate that no High Conservation Values identified in G1.8.1–3 will be negatively affected by the project.

The following biodiversity-related HCVs were identified in section G1.8:

- Endangered and vulnerable plant and animal species

- Endemic plant species and subspecies
- Significant concentrations of a species during any time in its life cycle
- Viable populations of plants and animals in natural patterns of distribution and abundance
- Threatened ecosystems

By protecting habitats and reducing fragmentation, disturbance, and conversion of primary forest at a landscape scale, the outcome for all of these HCVs will be much better in the with-project versus without-project scenario for the reasons noted above.

B1.3. Species Used by the Project

Identify all species to be used by the project and show that no known invasive species will be introduced into any area affected by the project and that the population of any invasive species will not increase as a result of the project.

Agroforestry demonstration activities currently underway will utilize the following species: *Leucaena leuococephala, Acacia* sp*.,* and *Morinda lucida.* While two of these species are not native to the DRC, they were successfully introduced to the country four decades ago for reforestation and agroforestry projects. Therefore, none of them have been imported for the purposes of the project. They have shown an ability for restoring and fertilizing marginal lands and improving yields when associated with crops. They have also shown a high level of adaptation to the environment, and they are non-invasive. It is possible that over the 30-year life span of the project, other species will be used. In no cases will these be invasive, and their use will be monitored and reported during project reporting and verification activities.

B1.4. Potential Adverse Effects of Non-Native Species

Describe possible adverse effects of non-native species used by the project on the region's environment, including impacts on native species and disease introduction or facilitation. Project proponents must justify any use of non-native species over native species.

The species noted above were introduced to the area more than 30 years ago and to date there are no known problems with disease introduction, facilitation or otherwise. They have been selected over native species due to their nitrogen-fixing capabilities and their ability to restore fertility in marginal lands such as secondary forests. The Mai Ndombe REDD project will actively consider the use of, and will conduct trials with, native species as a priority where feasible.

B1.5. Genetically Modified Organisms

Guarantee that no GMOs will be used to generate GHG emissions reductions or removals.

No GMOs will be used to generate GHG reductions or removals.

B2. Offsite Biodiversity Impacts

B2.1. Potential Negative Offsite Impacts on Biodiversity

Identify potential negative offsite biodiversity impacts that the project is likely to cause.

Per section CL2.1, there is no activity-shifting leakage attributed to the project. As well, there will be no displacement of population from the project area elsewhere. Therefore, there will be no offsite impacts to biodiversity.

B2.2. Mitigation of Potential Negative Offsite Impacts on Biodiversity

Document how the project plans to mitigate these negative offsite biodiversity impacts.

Mitigation is not applicable as there is no activity-shifting leakage.

B2.3. Evaluation of Unmitigated Negative Offsite Impacts Against Biodiversity Benefits

Evaluate likely unmitigated negative offsite biodiversity impacts against the biodiversity benefits of the project within the project boundaries. Justify and demonstrate that the net effect of the project on biodiversity is positive.

As there are no anticipated negative offsite impacts to biodiversity, evaluation of unmitigated offsite impacts is not applicable.

B3. Biodiversity Impact Monitoring

B3.1. Monitoring Biodiversity Variables

Develop an initial plan for selecting biodiversity variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's biodiversity objectives and to anticipated impacts (positive and negative).

Biodiversity variables for monitoring will be selected based on input from communities, stakeholders, and scientific experts (e.g., Missouri Botanical Garden and affiliated local DRC wildlife experts). Some or all of the following elements will be considered during development of the monitoring plan:

- The quantity and quality of native forest and/or natural vegetation in the project area.
- The status of species and habitat.
- The frequency or intensity of anthropogenic impacts that are directly harmful to biodiversity in the project zone (e.g., logging, hunting, agriculture conversion, fires).
- Progress on implementation status of project activities.

Monitoring activities will take place to correspond with each project verification period (anticipated to be approximately annually). Early project monitoring efforts will focus on project outputs and some outcomes. Monitoring efforts later in the project period will include outputs, but will also include a greater emphasis on outcomes and some medium- to longer-term impacts where feasible.

B3.2. Assessing the Effectiveness of Measures to Maintain or Enhance HCVs

Develop an initial plan for assessing the effectiveness of measures used to maintain or enhance high conservation values related to globally, regionally, or nationally significant biodiversity (G1.8.1–3) present in the project zone.

Indicators that are relevant to measuring the effectiveness of efforts to maintain or enhance HCVs and that are also specific, measureable, achievable, practical, and time bound will be selected based on input from communities and experts. These may be direct or proxy indicators and may, in some or most cases, depending on cost and practicality, be focused on the assessment of project outputs and outcomes and/or be relatively simple methods which allow participation from community members. HCV monitoring will take place at the same frequency as monitoring for general biodiversity variables.

B3.3. Full Biodiversity Monitoring Plan

Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

A full biodiversity monitoring plan will be developed within twelve months of project validation. It will be made publicly available on the internet and communicated to the communities and other stakeholders.

GOLD LEVEL SECTION

GL1. Climate Change Adaptation Benefits

GL1.1. Climate Change and Climate Variability Scenarios

Identify likely regional climate change and climate variability scenarios and impacts, using available studies, and identify potential changes in the local land-use scenario due to these climate change scenarios in the absence of the project.

Very few regional to subregional climate change scenarios using regional climate models or empirical downscaling have been constructed in Africa, mainly due to restricted computational facilities and lack of human resources and sufficient climate data (Parry et al., 2007). The few existing regionally downscaled climate models (e.g., Marshall et al., 2012; Platts et al., 2012) are focused on tropical East Africa. As a result, predicting the direction and magnitude of changes resulting from climate change in Africa, particularly central and western Africa, is subject to a high level of uncertainty within the models used. With these limitations considered, under the medium–high emissions scenario (SRES A1B, see the IPCC Special Report on Emissions Scenarios) used with 20 general circulation models (GCMs) for the period 2080–2099, annual mean surface air temperature in Africa has been predicted to increase between 3 and 4 degrees C, with less warming in equatorial and coastal areas (Parry et al., 2007). Since the 1960s, decadal warming rates of 0.29 degrees C have been observed in African tropical forests (Parry et al., 2007). A 2-degree C increase in temperature is generally perceived as a threshold beyond which severe ecosystem and human livelihood impacts will occur.

Between 1961 and 2000, there was an increase in the number of warm spells over southern and western Africa and a decrease in the number of extremely cold days (United Nations, 2009). As well, the five warmest years in Africa have all occurred since 1988, with 1988 and 1996 being the two warmest years. This rate of warming is not dissimilar to the rate experienced globally (Boko et al., 2007).

Several studies have highlighted the importance of terrestrial vegetation cover and the associated dynamic feedbacks on the physical climate. An increase in vegetation density, for example, has been suggested to result in a year-round cooling of 0.8 degrees C in the tropics, including tropical areas of Africa, and this cooling could partially compensate for greenhouse warming. The reverse effect is simulated in the case of land conversion, which is expected to increase in Africa over the next 50 years (Parry et al., 2007).

In the African tropical rainforest zone, declines in mean annual precipitation of around 3% in North Congo and 2% in South Congo for the period 1960 to 1998 have been noted (Parry et al., 2007). The central African rainforest is naturally drier than tropical rainforests of South America and South East Asia, and it has become drier in recent decades. Projected temperature increases under climate change are likely to accelerate this trend, with the potential to severely damage the forest ecosystem and its capacity to reliably provide essential ecosystem services such as water supplies for local communities and the forest products that sustain their livelihoods (Nkem et al., 2008).

As described in sections G2.4 and G2.5, the without-project scenario would result in the continued extreme underdevelopment of communities with education and healthcare infrastructure and delivery capacities already at very low levels. Biodiversity would be significantly impacted as a result of most of the primary terra firma forest being logged, followed by subsequent events leading eventually to deforestation. The potential climate changes described above would place even greater stress on the health and well-being of the people within the communities in the project area and on the biodiversity of the area under this scenario.

GL1.2. Risks to the Project's CCB Benefits

Identify any risks to the project's climate, community and biodiversity benefits resulting from likely climate change and climate variability impacts and explain how these risks will be mitigated.

As noted in section GL1.1, predicting the direction and magnitude of climate change in Africa is subject to a high level of uncertainty. However, over the period of this project, an adaptive management approach will be used to identify and mitigate climate-change-related impacts on the project's climate, community, and biodiversity benefits.

Congo Basin forests generate 75–95% of regional rainfall through evaporation and evapotranspiration (World Wildlife Fund, 2007). Evaporation from the Congo Basin contributes about 17% of West Africa's rainfall. Deforestation will potentially cause a decline in rainfall as far away as North America and Europe (Nkem et al., 2008). The Congo Basin forest is also highly strategic as a defence, shielding water in the Congo River from the intense heat and accelerated evaporation resulting from climate change (Nkem et al., 2008). Stopping legal and illegal logging, charcoal production, and slash and burn agriculture within the project area will allow the project to contribute to the mitigation of these and other climate-change-related impacts of deforestation.

Three types of effects that could be related to climate change are impacting local communities in the Mai Ndombe region. First, bimodal dry seasons have been observed to be longer and more unpredictable than in the past. As an example, in 2011 the short dry season, which normally occurs from late January to the end of February, carried on right through to the June rainy season. These abnormally long periods of drought have had a major negative impact on crop yields, creating food security problems in a region that does not normally have food supply insecurity. To counter these effects, the project is taking a series of concrete measures both to intensify and to diversify agricultural production (see Table GL1.1 for more detail). These measures will improve the likelihood that communities in the project area will be able to meet subsistence yield levels even during these longer periods of sustained drought.

Second, higher wind velocities during severe thunderstorms/microbursts have been observed over the last 10 years which have caused major damage to housing and considerable loss of life. The project will generate revenues to be deposited in community-managed local development funds, with a large share of these investments to be used for badly needed upgrades to existing structures and the construction of new structures. Both measures will have lasting positive impacts on building quality, as these renovated and new structures will be built to standards, which were previously absent, that will allow them to resist high storm-force winds.

The third climate change threat comes from increased Lake Mai Ndombe air and lake water temperatures as a result of increased annual mean surface air temperature. In the region's vast aquatic systems (lakes, rivers, and connected large areas of swamp forest), increases in water temperature negatively impact biological oxygen demand, which in turn stresses fish stocks. These stocks are already under threat from habitat loss (e.g., rearing channels affected by logging and anthropogenic fires) and overfishing. Air temperature increases have also contributed to an observed increase in malaria, which is often in epidemic proportions (with high mortality rates). The project will help to mitigate these impacts by providing communities with fisheries enhancement measures, substantive improvements to health care infrastructure, better access to essential medicine, and education on disease prevention measures.

Finally, tropical forests are widely considered to be safety nets that provide subsistence goods and services to help people get through difficult times, such as crop failures, illness, and shortages in household energy supplies. These safety nets are crucial mechanisms for climate change adaptation and constitute important drivers for reactive adaptation in communities dependent on natural resources

(Nikem, et al., 2008). As noted above, the primary way in which deforestation impacts will be mitigated in the project area is by stopping legal and illegal logging.

A high degree of uncertainty is also associated with predicting the effects of climate change on biodiversity. However, it is thought that climate change could have an impact on biodiversity and related species distributions. In the medium term (10 to 20 years), biodiversity of indigenous plants and animals in Africa is likely to be affected by all of the major environmental changes that constitute climate change. These include changes in ambient air temperature, rainfall, and air vapour pressure deficit (which combine to cause altered water balance), rainfall variability, and atmospheric $C0_2$ (Boko et al., 2007). The IUCN (2011) rates climate change as one of the top five threats to biodiversity.[20] These impacts could include changes in timing of life cycles, such as blooming and migration; changes in species distribution and abundance; changes in morphology and reproduction of organisms; and changes in ecosystem processes, such as species interactions (Boko et al., 2007).

An example of the potential impact of climate change on biodiversity comes from an assessment using two different climate change scenarios of the species sensitivity of African mammals in 141 national parks in sub-Saharan Africa. Assuming that the migration of species does not take place, it is forecast that 10–15% of African mammals will fall under IUCN red list categories (IUCN, 2001) of critically endangered or extinct by 2050. This percentage range is likely to increase to 25–40% by 2080. Assuming unlimited species migration, the results are less extreme, with those proportions dropping to approximately 10–20% by 2080 (United Nations, 2009).

The primary way in which climate change impacts on the project's biodiversity benefits will be mitigated is, again, through the protection of terra firma forest, both primary and previously selectively logged, by the cessation of both legal and illegal logging.

GL1.3. Impact of Climate Change on Community Well-Being and/or Biodiversity

Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of communities and/or the conservation status of biodiversity in the project zone and surrounding regions.

Human populations in Africa are widely expected to be more vulnerable to climate change than populations in other parts of the world as a result of the conflation of three factors: a higher than global average degree of change; high levels of dependence on natural resources and forest goods and services; and a low degree of adaptive capacity (Peach Brown, 2011). Africa's low adaptive capacity is due largely to extreme poverty, frequent natural disasters, agriculture that is heavily dependent on rainfall, and other structural weaknesses (United Nations, 2009).

Africa generally and the DRC specifically are among the world regions with the lowest food security and the lowest ability to adapt to future changes, as indicated in the human development index (HDI; UNDP, 2011). The implications of this state of food insecurity in Africa and the consequent limited ability to adapt to climate change are significant (Boko et al., 2007). This situation clearly applies to the people in the communities within the project area as, for example, noted in section GL1.2 with regard to the unusually long drought period in 2011 and the resultant impact on crop yields.

Human health is predicted to be adversely affected by projected climate change in Africa. In recent years, it has become clear that climate change will have direct and indirect impacts on diseases that are

[20] The four other threats have been identified by the IUCN as habitat loss and degradation (which would occur with the baseline scenario), invasive alien species, over exploitation of natural resources, including resource extraction (which would occur in the baseline scenario) and pollution and diseases.

endemic to Africa. For example, recent data from West Africa indicate that the risk of new epizootic diseases is increasing in the region, with, for example, significant exposure to the Rift Valley Fever virus among livestock herders and wildlife rangers during the wet season (Parry et al., 2007). As noted in section GL1.2, this disease-related impact has been observed in the project area with an observed increase in malaria.

GL1.4. How Project Activities Will Assist Communities and/or Biodiversity to Adapt to Climate Change

Demonstrate that the project activities will assist communities and/or biodiversity to adapt to the probable impacts of climate change.

Following are some examples of project activities that could assist communities and/or biodiversity to adapt to probable impacts of climate change. For the Mai Ndombe REDD project, the development and implementation of these mitigative and adaptive strategies will be adaptive in nature, will be community based, and will include input from women representatives.

Table GL1.1 Climate change risks, potential effects, and potential mitigative/adaptive strategies.

Climate Change Risks	Potential Effects	Potential Mitigative/Adaptive Strategies
Pockets of rain in the dry season	Could have positive effects on some agricultural species, such as banana, plantain, and cassava	Extend cultivation of appropriate species over a wider area/time
Drying of swamp forests and some watercourses	Could have a positive impact on the growing of some crops and the number of growing cycles	Expansion of production and yields
Drying of swamp forests and some watercourses	Could have a negative impact on availability of building materials (e.g., palm fronds for thatch), availability of food sources, and transportation by pirogue (a type of canoe)	Other types of roofing materials could be made available through the project, some of which would be longer lasting
Torrential rains in the rainy season	Cassava tuber rot	Seek improved seeds, relocate fields
Pockets of drought in the rainy season	Withdrawal of wildlife, reduced crop production	Reduce the pressure of illegal hunting on stressed wildlife species, protect terra firma forest, seek more tolerant crop/seed varieties

Climate Change Risks	Potential Effects	Potential Mitigative/Adaptive Strategies
More intense and longer heat spells/dry seasons	Increase in the number of bush fires; death of seedlings planted as a project activity; fewer edible caterpillars and mushrooms and other non-timber forest products; decrease in fish stocks; animal morbidity; outbreak of diseases such as malaria and typhoid; loss or degradation of community water sources; crop failures	Raise awareness of the dangers of bush fires; plant a wider variety of species increasing percentage survival; use more drought-resistant nitrogen-fixing crops; plant caterpillar host plants; promote improved livestock-raising techniques; improve access to health care and provide education on disease prevention measures; improve access to potable water through creation of wells and other means; diversify crops and reduce monocropping; agroforestry techniques such as interplanting and use of shade trees
Low capacity of local populations to adapt to frequent natural disasters	Increase in periods of food insecurity, potential increase in disease and deaths with continuing very low health standards, potential for increasing intercommunity conflict	Increase support of local institutional structures, including the norms and rules of governance, to help develop adaptive strategies; increase literacy levels; diversify livelihood activities and income generation projects; involve women to a greater degree in decision-making processes,[21] increase general participation in decision making at the local level
Increase in high winds	Loss of branches of multipurpose trees, damage to poorly constructed structures	Plant trees around important species as wind breaks; contribute project funds to building renovation and construction using better building standards
Decreased biodiversity, loss of forest cover to drought, temperature change	Reduction in species, more species at risk	Help to maintain intact and interconnected ecosystems through protection of the primary forest; plant species more resistant to the climate change that is occurring

[21] The Readiness Preparation Plan (R-PP) of the DRC (Ministry of Environment, Conservation of Nature, and Tourism) has pledged to make sure that gender issues are streamlined throughout the REDD+ readiness process to make sure gender dimensions are addressed in community forest management and the distribution of benefits (Peach Brown, 2011).

GL3. Exceptional Biodiversity Benefits

GL3.1.1 Demonstration of High Biodiversity Priority

Project proponents must demonstrate that the project zone includes a site of high biodiversity conservation priority by meeting either the vulnerability or irreplaceability criteria defined [in the CCB Standards, p. 35].

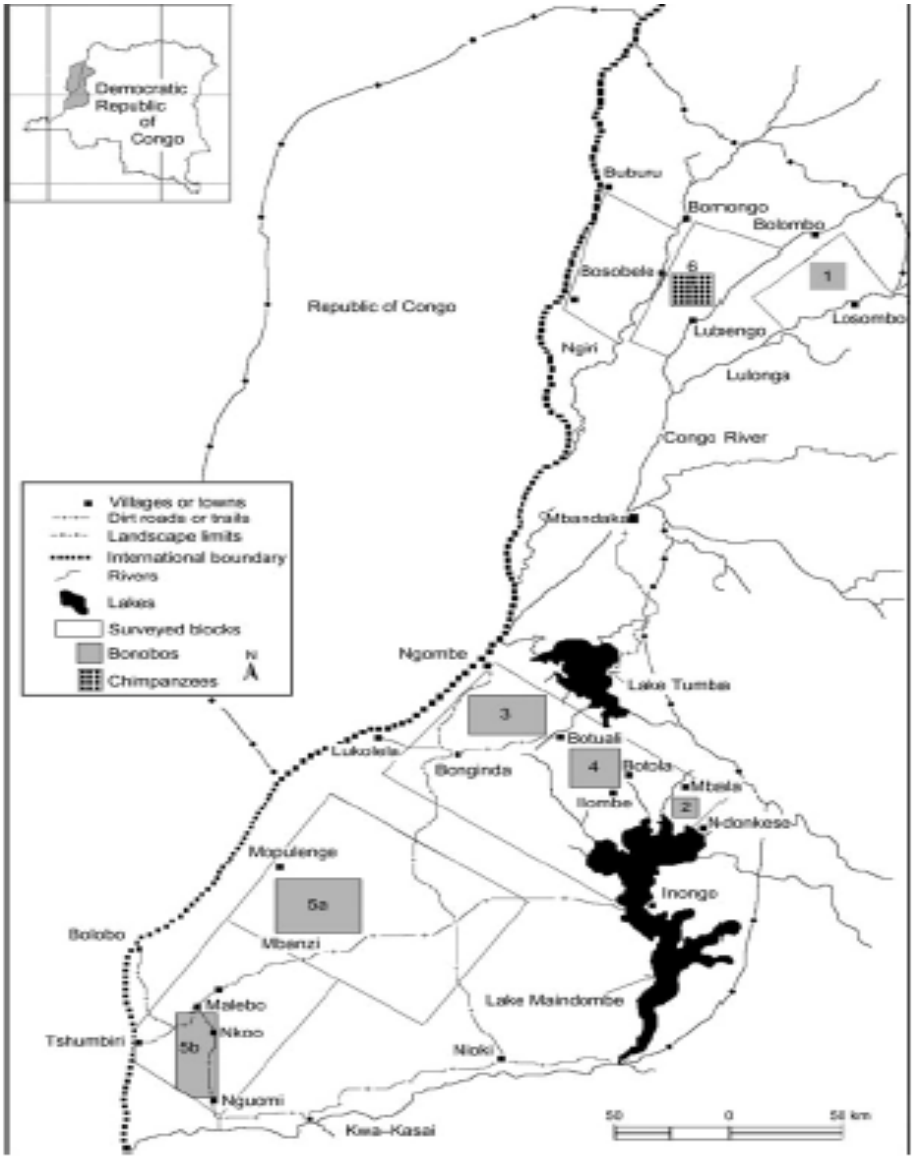
The Lac Tumba–Lac Mai Ndombe region (ca. 78.972 km^2) supports a significant population of bonobos (Pan paniscus) which, along with the common chimpanzee, are the genetically closest extant relative to humans. Bonobos (the name of which may have emerged as a mispronunciation of the town Bolobo on the Congo River whence the animals were once shipped) are shown as endangered on the IUCN Red List of Threatened Species and likely number less than 50,000 individuals, living only in the DRC. Three characteristics of the Lac Tumba–Lac Mai Ndombe region enable the bonobo population: (1) the seasonally and permanently inundated forests, which enable bonobos to access fruits and seeds asynchronous with terra firma forests; (2) the food supply of arrowroot herbaceous plants (Marantaceae family); and (3) the traditional culture of the Banunu territory, where the great chief of the Bateke has made hunting bonobos taboo.

Estimated populations of the bonobos are listed in Table GL3.1 below; gray-shaded areas on the map in Figure GL3.1 indicate where the populations have been identified. Additional populations in the region remain to be identified as indicated by the fact that the populations in our project area do not yet appear on the map (Inogwabini et al., 2007).

Table GL3.1 Estimated populations of bonobos in the Lac Tumba–Lac Mai Ndombe region.

Name	Area (km^2)	Swamps or savanna	Suitable habitat (km^2)	Density			Population estimate		
				Low	Mean	High	Low	Mean	High
Boutuali-Ilombe	955	573	382	0.24	0.27	0.29	91.7	103.1	11.8
Ngombe-Bonginda	1829	1098	731	0.24	0.27	0.29	175.6	197.5	212.1
Mbala-Donkese	160	94	64	0.24	0.27	0.29	15.4	17.3	18.6
Northeast Mbanzi	1,380,390	552,156	828,234	..	..	..	..	..	..
Malebo-Nguomi	1993	949	1044	1.8	2.2	3.4	1879.5	2297.1	3550.1

Figure GL3.1 Identified Bonobo Populations in the Lac Tumba/Lac Mai Ndombe Region



The project site contains areas with regular occurrence of Hominidae Pan paniscus, or the bonobo, as demonstrated by local knowledge and recent biodiversity surveys (Missouri Botanical Garden, 2012). Habitat provided for the bonobo by the project site consists of mature uplands forest and swamp forest. By protecting these habitats, the Mai Ndombe REDD project provides a clear positive benefit for this endangered species.

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