JADORA

SAFBOIS S.P.R.L.

PROJECT DESIGN DOCUMENT (PDD)

For validation at

"CLIMATE, COMMUNITY & BIODIVERSITY ALLIANCE (CCBA)"

March 2012

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GENERAL INFORMATION

Location of the Project

Country: *République Démocratique du Congo* (Democratic Republic of Congo)
Nearest City: Isangi (100 km West of Kisangani)
Province: Orientale
Precise Location of Project Activities: 0°24' North, 23° 55' East
Description: Isangi Logging Concessions of Safbois Group

Implementing Organizations

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EXECUTIVE SUMMARY

This Project Design Document (PDD), designed for approval under the Climate, Community and Biodiversity (CCB) Standards, Second Edition, December 2008, is submitted by Jadora LLC (Jadora) on behalf of Jadora and its partner, Safbois S.P.R.L (Safbois). Jadora, a sustainable land and resource management company, and Safbois, a Congolese logging company, have partnered to implement a Reduced Emissions from Deforestation and Degradation (REDD) project in the Isangi Territory of Orientale Province, in the République Démocratique du Congo (RDC). The project area contains 239,728 hectares of primary forest located on a 348,000 hectare Safbois logging concession just south of the Congo River.

The forests of the Congo River Basin in Africa make up the second largest tropical rainforest in the world, rivaling those of the Amazon Basin. The majority of these forests lie in the RDC, and the FAO estimates the deforestation rate in the country to be 0.2% to 0.4% per year. Due to the cessation of hostilities after a 14-year armed conflict, the RDC is experiencing rapid economic expansion and population growth resulting in an increase in the rate of deforestation and continued pressure on forest resources.

Without intervention, the cumulative impact of forest-related activities will be realized over the next century with the region. Similar to the Amazon rainforest, the Congo rainforest is susceptible to clearing for both subsidence and industrial agriculture, yet far more people inhabit the Congo basin than reside in the Amazon. The population of the Congo is currently estimated to be growing at a rate greater than 3% per year. The Isangi Territory alone holds around 350,000 indigenous people. Of this number, it is estimated that 100,000 - 150,000 live in the concession.

The primary objective of this project is to address the issue of deforestation in the RDC on a local level, preventing emissions that would otherwise occur from the conversion of forest to areas for subsistence agriculture. The project aims to protect a threatened, biologically diverse forest with thousands of rare and declining species as well as to improve the livelihoods of the area's forest-dependent people.

The project will be submitted to the Verified Carbon Standard (VCS) for validation against VM0006, Version 1.0, *Methodology for Carbon Accounting in Project Activities that Reduce Emissions from Mosaic Deforestation and Degradation*.

The project will implement a program to prevent degradation and deforestation by replacing the drivers of deforestation with more sustainable ways to meet the needs of the local community. Project activities to be implemented fall under the categories of agriculture, aquaculture, fuel use, education, healthcare and community outreach.

GENERAL SECTION

G1 Original Conditions in the Project Area

G1.1 Project Area Location and Physical Parameters

Country: Democratic Republic of Congo
Nearest Large City: Yangambi (100 Km West of Kisangani)
Territory: Isangi
District: Yangambi
Province: Orientale
Precise Location of Project Activities: 0°24’ North, 23° 55’ East
Description: Isangi Logging Concessions of Safbois Group

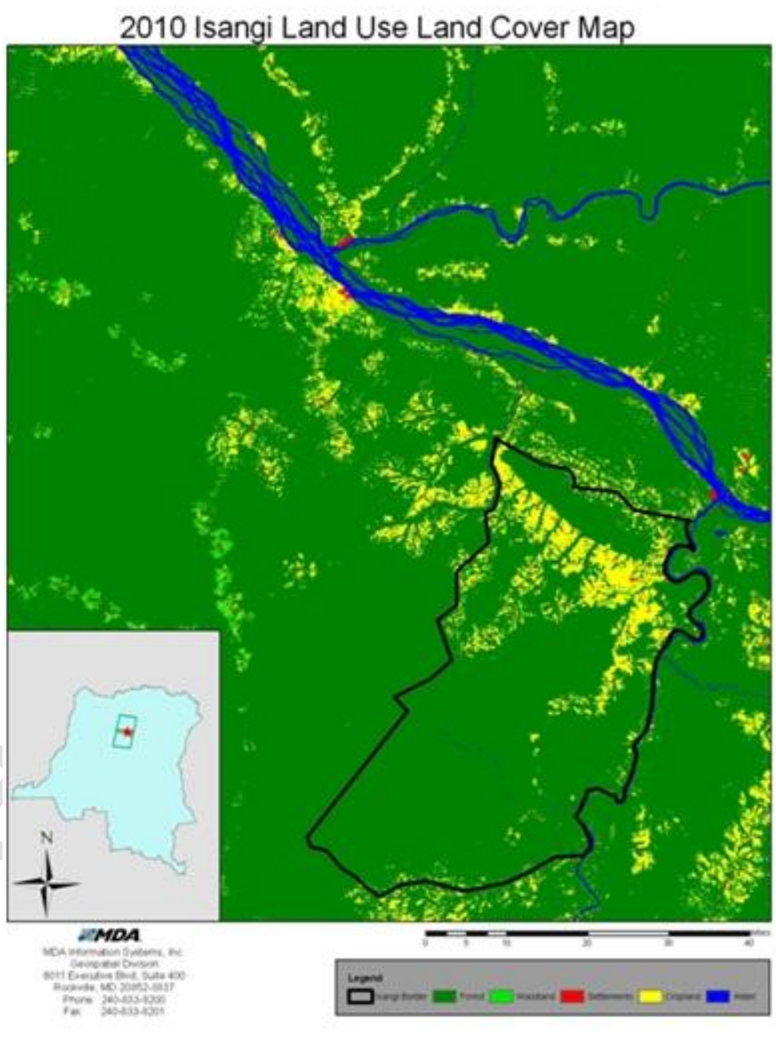

Figure 1 Land use cover map for the historical reference region, showing the following classes: forest (green), woodland, yellow-green, cropland (pale), settlements (red), and water (blue) for 2010.

Jadora and Safbois are developing an emission reduction project on a 348,000 hectares logging concession in the Democratic Republic of the Congo. A significant portion of the concession is well suited for a REDD project. The original Safbois concession consists of two sections, a large concession (252,000 hectares) just south of the Congo River near the town of Isangi and a smaller, adjacent concession (96,000 hectares) to the south. Safbois' plan before pursuing a carbon sequestration project was to log the forested parts of the concessions on a 30-year rotation schedule. As of 2006, the concessions had approximately 218,000 hectares of forest suitable for commercial selective logging. There are tens of thousands of hectares of deforested areas in the remaining 130,000 hectares of the concession.

The REDD project area (total 261,500 hectares) contains a single continuous parcel of forest (239,700 hectares) experiencing active deforestation on three sides and in a few interior areas. The coordinate centroid is 0^{o} 24’ N, 23^{o} 55’ E.

Aside from the mature, accessible forest on the concessions, the rest of the land consists of swampy “wet” forests that can't be logged commercially at this time (65,000 hectares), human settlements and smallholder farms (60,000 hectares), and large commercial farms (5,000 hectares). There are approximately 150,000 people in 33 villages and towns in the region of the concessions, with the largest concentration in and around the town of Isangi on the Congo River. Seventeen villages, with approximately 50,000 people, are located within the actual project area. The southern concession is sparsely populated, but almost 95% of its forest is accessible to logging. The intact forest makes up the southern and western sides of the concessions, and its distance from navigable water and roads has helped safeguard it from clearing. The business-as-usual case sees continued selective logging of valuable trees over 80 cm in diameter from approximately ten valuable species. The logging is highly selective with an average of less than one log removed per hectare. Blocks of timber are logged on a 30-year cycle with approximately 4,000 hectares of land logged each year. The creation of logging roads has opened the forest to exploitation by people on foot and on bicycles and motorcycles.

The project area consists of 239,700 hectares of intact primary forests. This area consists of two main types of forest, upland “drier” and lowland “wetter” forests. The forest canopy is almost 100% throughout and approximately 45-60 meters in height, as determined from inspection of high resolution satellite imagery in Google Earth and from 548 forest inventory plots. The landscape contains hundreds of small and medium size streams and rivers that flow into the Lomami River, which is part of the Congo River basin/watershed. The climate type is AF in Koppen classification with an average rainfall of above 1,500 mm per year. The soil is continually wet and has very low nutrient and mineral contents other than in the shallow organic humus on the surface. The underlying base soils throughout the area are ferralsols, ferrisols and areno-ferral-undifferentiated rocks. In areas along the rivers there are also kaolisols soil types. These poor soils require significant organic and mineral inputs to support crop production, and historically, these inputs were derived from clearing forests (Brand and Pfund 1998). Thus poor soil fertility motivates the key driver of deforestation in the project, and project activities will focus intensely on helping smallholder farmers extend the time they can fruitfully harvest crops from cleared land.

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

The project and reference areas were stratified in a hierarchical fashion. Land was classified first as Forest vs. Non-forest, with areas designated as non-forest further classified as agriculture, woodland, or settlements. Training data for interpreting Landsat TM images were established from SPOT imagery extracted from Google Earth for 2010 and from 339 waypoints and 548 permanent sampling plots inside forest

We collected ground data for validating and calibrating remote sensing images in the project area near the Congo and Lomami Rivers in October and November 2010. Data on tree cover, soils, etc. were collected at 439 waypoints and visually interpreted (georeferenced photos available) with the aid of information provided by a local guide (such as length of time the area was flooded each year). Additional remotely sensed land cover ground data, such as the Soil Adjusted Vegetation Index (SAVI) was obtained using high-resolution RapidEye imagery collected in 2010.

Once these training data from the 439 waypoints were established, 25% of the data was separated as validation data, leaving 75% for calculations. The data was divided utilizing a random stratification sampling method based on a model developed in ERDAS IMAGINE that removed bias due to proximity.

Table 1 Satellite data used in the classification of vegetation from satellite imagery for the Isangi REDD project.

Data	Source	Resolution	Spectral Frequency
Band 1	Landsat 4, 5, 7 TM et ETM+	30 m	Blue 0.45-0.52 μm
Band 2	Landsat 4, 5, 7 TM et ETM+	30 m	Green 0.45-0.52 μm
Band 3	Landsat 4, 5, 7 TM et ETM+	30 m	Red 0.45-0.52 μm
Band 4	Landsat 4, 5, 7 TM et ETM+	30 m	NIR 0.45-0.52 μm
Band 5	Landsat 4, 5, 7 TM et ETM+	30 m	SWIR 0.45-0.52 μm
Band 6	Landsat 4, 5, 7 TM et ETM+	120 m	Thermal 10.4-12.5 μm
Band 7	Landsat 4, 5, 7 TM et ETM+	30 m	SWIR 2.08-2.35 0.45-0.52 μm
Visual	Landsat 4, 5, 7 TM et ETM+	5m	Visible

Using these variables (Table 1), first a cloud mask was constructed by identifying clouds using a combination of bands 1 and 6 and cloud shadows using band 4 (Martinuzzi et al. 2007). After masking clouds, an unsupervised classification with 40 classes and a convergence of 0.95 was conducted in ERDAS Imagine to initially classify the 2010 Landsat 5 TM scene (Figure 1). This unsupervised classification yielded multiple classes that were then grouped during a supervised classification using the training data from the 339 waypoints and 548 forest inventory plots. We initially attempted to separate upland primary and secondary forest from wet forest (inundated 1-3 months/per year) because our impression from the 339 waypoints and interviews taken during the social surveys suggested that people avoid clearing wet forest. However, the best grouping of classes for wet forest included significant proportions (> 25%) of cloud shadows and upland forest. Grouping wet and upland forest led to accurate classification (> 90%). Classes were also tested for separability, using the separability test in ERDAS Imagine. This test compares pairs of classes and calculates a separability score; scores less than 1700 indicate that classes should be merged. For our five non-cloud classes, mean separability scores for grouped classes in the supervised classification were all greater than 1730, indicating that satellite imagery reliably predicted vegetation type.

Manual edits were made where necessary, based on inspection of 2010 SPOT images from Google Earth. These edits were most prevalent between the woodland versus forest and cropland classes due to the similar spectral signature of secondary forests and woody vegetation as well as intermixing of cropland and woodland classes within single pixels.

Table 2 Land cover class descriptions for the Isangi REDD Project.

LULC Class	Description
Forest	Includes broad leaf forest and needle leaf forest: trees > 3 meters in height, canopy closure > 30%.
Woodland	Woody vegetation < 3 meters in height, with at least 10% ground cover. Includes abandoned fields where small trees and other vegetation are growing.
Settlements	Developed areas and settlements that are at least 30meters wide, including roads and cleared plots.
Cropland	Agriculture including large scale plantations, subsistence farms, pastures, and cleared plots.
Water	All bodies of water greater than or equal to 0.08 hectare (1 TM pixel).

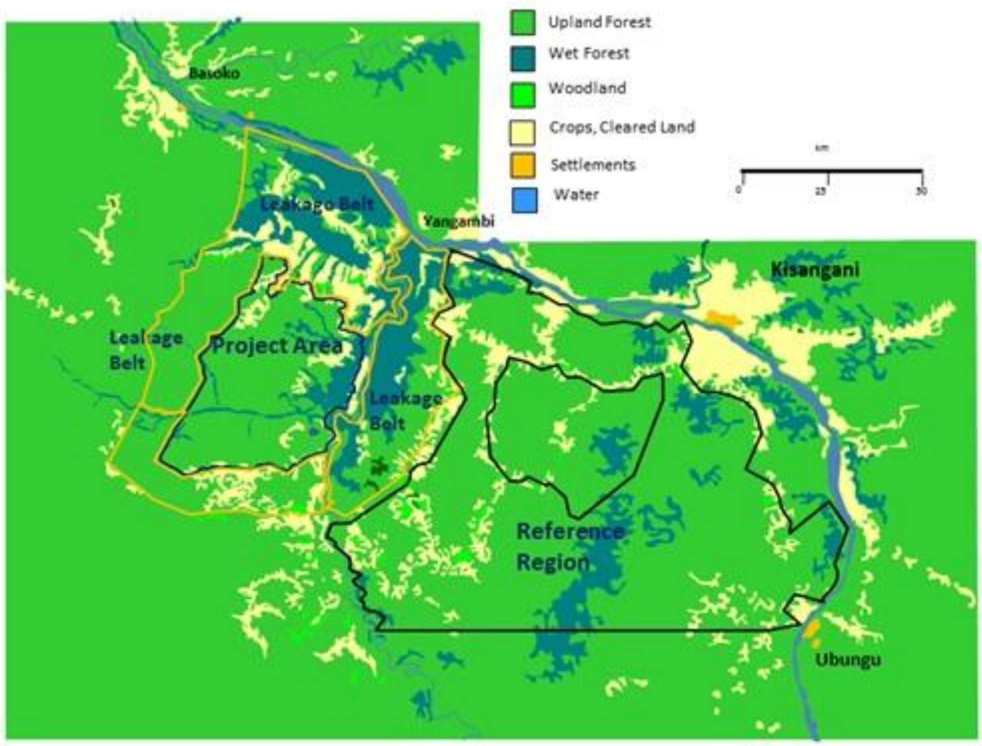

Figure 2 **Stratification of the project area (dark blue border), leakage belts (purple border), and project reference region (black border) are shown. Forest cover is stratified into wet (blue-green) vs. upland forest (green). Other classes include cropland (pale), woodland (light green), settlements (orange), and water (aqua blue).**

Table 3 **Land Use Classification Error Matrix for the Isangi project.**

A. Land Use Classes							
Class Assigned				**Class Observed**			
	Forest	Woodland	Settlements	Cropland	Water	Total	**Omission**
Forest	557	24	0	0	0	581	95.9%
Woodland	5	122	0	4	0	131	93.1%
Settlements	0	2	53	5	0	60	88.3%
Cropland	1	9	4	79	1	94	84.0%
Water	0	0	1	2	18	21	85.7%
Total	563	157	58	90	19	887	
Commission	98.9%	77.7%	91.4%	87.8%	94.7%	Overall Accuracy	93.5%

B. Forest and Non-Forest Classes				
Class Assigned			**Class Observed**	
	Forest	Non-Forest	Total	**Omission**
Forest	557	24	581	95.9%
Non-Forest	6	300	306	98.0%
Total	563	324	887	
Commission	98.9%	92.6%	Overall Accuracy	96.6%

Overall classification was sufficiently accurate (> 90%) to avoid uncertainty deductions.

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

Boundaries of the project area, leakage belt, and reference region are clearly indicated in Figures 2 and 3. The project area is bounded by a logging concession to the northwest. The project zone is bounded by logging concessions to the north and the west, a protected area (Yangambi Biosphere Preserve) to the northwest, and another protected area (Kokolopori Bonobo Reserve) to the west. Consequently, the only suitable reference region occurred to the east and southeast of the project area, bounded on the north and east by the Congo River, and on the west by the Lomami River and the project leakage belt. The reference region encircles but does not include the Siforma, Ltd. logging concession southwest of Kisangani. The area to the north of Kisangani has higher deforestation rates with different drivers (commercial plantations and commercial agriculture) than the reference region. The chosen reference region has similar fractions of wet forest, upland forest, and woodlands as the project area, and deforestation is driven primarily by shifting agriculture rather than installation of plantations or charcoal harvest.

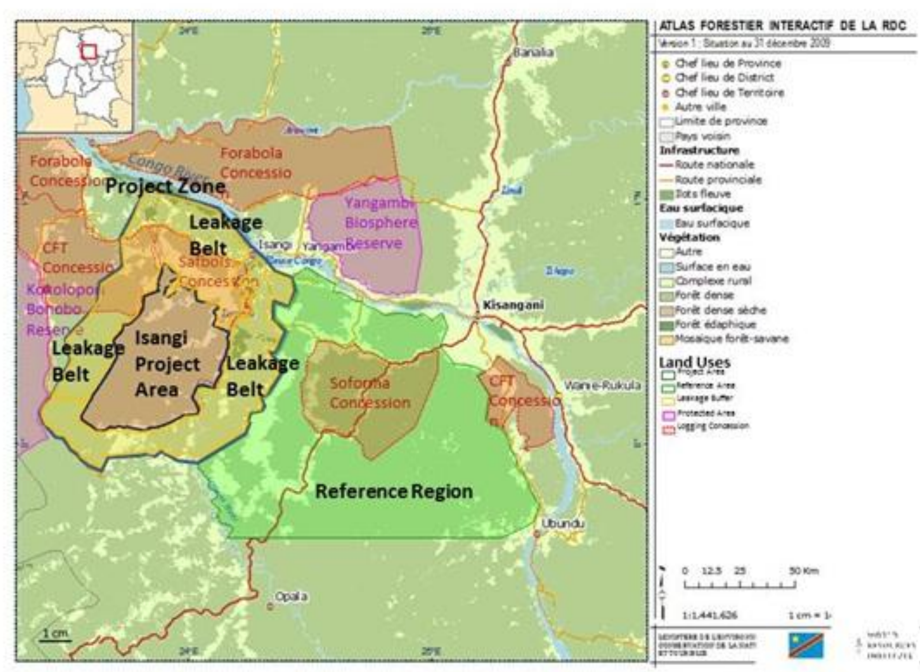

Figure 3 Map of project area (black outline), leakage buffer (orange outline) and reference region (red outline) in relation to land use category and forest strata (wet vs. upland forest). Urban areas with > 50,000 people occur within 50 km the project area and leakage belt (Basako, to the northwest, and Yangambi) and the reference region (Kisangani and Ubundu).

The project area (total 261,500 hectares) contains a single continuous parcel of forest (239,700 hectares) that has active deforestation on three sides and in a few interior areas. The coordinate centroid is 0^{o} 24' N, 23^{o} 55' E. Protected areas near the project are the Yangambi Biosphere Reserve and The Kokolopori Bonobo Preserve. the leakage belt extends into the CFT concession 015 to the west.. The project area is surrounded by a leakage belt approximately 30-45 km in width. This range is the distance from the project area to which shifting agriculture displaced by project activities is most likely to occur, as predicted by a spatial model of deforestation developed to determine the leakage belt per VCS methodology VM0006 (see CL2.1). The leakage belt is wider for areas closer to roads, to navigable rivers, to villages or towns, and to the forest edge where deforestation is more likely (see section CL2.1 for further explanation), such as on the northern and southern boundaries of the project area. Conversely, the leakage belt is narrower in areas farther from roads, rivers, villages and the forest edge, such as areas to the west of the project area. Also, per methodology requirements, both the reference region and leakage belt are larger than the project area, with the leakage belt (494,900 hectares) being 1.89 x and the reference region (927,100 hectares) being 3.55 x the project area.

Project Zone

The 'project zone' is defined as the project area and the land within the boundaries of the adjacent communities potentially affected by the project. Communities affected by the project all lie within the project area or leakage belt. Thus the project zone is the combined project area and leakage belt, indicated by the blue border in Figure 3.

G1.4 Carbon Stocks within the Project Area

Approach/Methodology

The applicable VCS sectoral scope for the projects is: Agriculture, Forestry and Other Land Uses (AFOLU), under project activities Reduced Emissions from Deforestation and Degradation (REDD), and specifically Avoiding Unplanned Mosaic Deforestation and Degradations (AUMDD). This project falls under the definition provided in the VCS Program Update of May 24th 2010, by virtue of the fact that > 25% of the boundary of the Project Area is within 50 meters of land that was anthropogenically deforested in the ten years prior to the project start date.

Carbon stocks were measured according in accordance with VCS Methodology VM0006, Version 1.0 *Methodology for Carbon Accounting in Project Activities that Reduce Emissions from Mosaic Deforestation and Degradation*.

Standard Operating Procedure for Field Sampling

Jadora currently employs over 40 local Congolese in its forestry teams. Under the direction of Dr. Ethan Freid, the teams have spent the last two years travelling throughout the project area gathering the initial forest data required to develop the project using predetermined waypoints to set up each permanent plot.

Field teams applied the following methodology:

- *Design of plots & regime for sampling:* Upon arriving at the predetermined plot location, a Haglof distance transmitter is erected at the center point and a series of nested circular plots is established. Within the circular plots, tree diameter, height, species ID and lying dead wood are measured using standard forest measurement devices (DBH tapes, Clinometers). Each plot is permanently marked using a metal spike and flagging around trees within a few meters of the center point.

- *Diameter at Breast Height (DBH):* The biomass of trees correlates most strongly with DBH. A series of nested circular plots are sampled. The plots are 4, 14, and 20 meters in radius. Within the four (4) meter radius plots, all trees 5.0 centimeters or greater in DBH are measured. Within the 14 meter radius plots, all trees 20.0 centimeters or greater in DBH are measured. Within the 20 meter radius plots, all trees 50.0 centimeters or greater in DBH are measured. All measured trees are permanently marked with a numbered aluminium tag at DBH point on the south side of the tree. Jadora foresters identify trees to specie–level granularity when possible.

- *Height of Trees:* Height is measured using a Suunto % secant PM5/SPC clinometer (precision = 1/5%) for all trees 20.0 centimeters or greater in DBH. The canopy height and bowl to first major branch point is measured.

- *Lying Dead Wood:* Twenty (20) meter transect lines are laid out North, East, South, and West of each plot center. Along each transect line, the diameter of all lying dead wood 5.0 centimeters and greater that cross the line is measured. Additionally, the decay status of each piece is determined using a machete test.

Strata & Carbon Pools

Both the reference region and project area had the same strata.

Wet Forest	Primary or secondary growth forests that are inundated at least one month per year, but are not inundated sufficiently to develop peat soils and thus be classified as swamp.
Upland Forest	Primary or secondary forest that is not inundated more than one month per year and typically has one or more trees greater than 50 centimeters in diameter.
Woodland:	Low growing trees < 3 meters in height or woody shrubs, indicative of regenerating forest.
Cropland	Open areas lacking in trees; used for growing annual/perennial food plants.

Water	Significant bodies of open water associated with the many large navigable rivers in the region.
Settlement	Villages, towns or cities.

The pools measured in forest carbon plots include above ground woody biomass and lying dead wood. Below ground biomass, litter, and soil were not included, resulting in conservative estimates of current carbon stocks in the project area.

Sample Size & Plot Allocation

The sample size rationale for the plot design was based on industry standards for sampling tropical forests. The rationale for the number of plots was to oversample throughout the forest to provide the most conservative estimates of the carbon stocks throughout the forest and within and between the forest strata identified.

Five hundred and forty eight (548) permanent plots are located in forest areas in the Isangi Territory, RDC (see Figure 4). The plots are divided between two areas. The first area is 135,000 hectares and has 496 plots, and the second area is 30,000 hectares and has 52 plots. The plot site locations are determined by using satellite imagery and encompass all forest LULC's in the area.

To avoid bias the placement of plots was determined using a 2009 satellite image with Arc view. A grid was formed with the intersection of the grid lines being where plots are located. The location of each of the line intersections was determined, coded, and programmed into Garmin GPS 60 CSX [Lat/Long (hours, minutes, seconds) WGS 84].

We will identify 150 new forest plots in the leakage belt in which to quantify standing stocks of forest carbon. We will also conduct village surveys annually to determine the implementation of alternative livelihoods and especially adoption of alternative farming practices and livestock husbandry.

Sample Framework for Field Data, including Size, Layout, and Location.

The forest is monitored for land use cover and cover change using Landsat 4, 5, and 7 TM images, which date back to 1999. Carbon stocks are monitored by sampling trees in a nested circular quadrat at systematically sampled points throughout the project area. All trees > 5 centimeters in diameter are sampled in the inner circle of 8 meter radius, all trees > 20 centimeters in diameter are sampled in a middle 28 meter radius, and all trees $\geq$ 50 centimeters in diameter in quadrat of radius 40 meters, a grid of forest carbon plots measuring the carbon content of the forest (Figure 4), and a suite of monitoring strategies to track farming activity and charcoal production within the reference area, the leakage buffer, and the concession itself.

Density of trees represented by the encounter of tree *j,* or d_j, was $1/p_j$ where p_j is the portion of a hectare represented in the sampling quadrat in which the tree was counted. For example, small trees (5 < DBH < 20 centimeters) were only counted in the centre quadrat, of area 201.8 m^2, which represents 0.0201 hectares. Thus, the encounter of a single tree in the interior quadrat implies that there are $1/p_j$ trees like it in a hectare. Similarly, trees 20 $\leq$ DBH $\leq$ 50 centimeters were sampled only in the centre or middle quadrats, an area of 2,463 m^2, representing 0.2463 of a hectare. The occurrence of a middle size tree implied 4.06 trees like it in a hectare. Finally large trees (> 50 centimeters dbh) were counted in the entire 40 meters radius quadrat, and the occurrence of one implied 1.989 trees like it in a hectare.

To ensure a conservative estimate of sequestered carbon, forest teams are monitoring only above ground woody biomass in the forest plots. Teams of local foresters have been trained to conduct the monitoring, with oversight from the project management team as necessary to achieve the precision required by best practices.

Figure 4 presents the systematic sampling layout of forest plots in the project area.

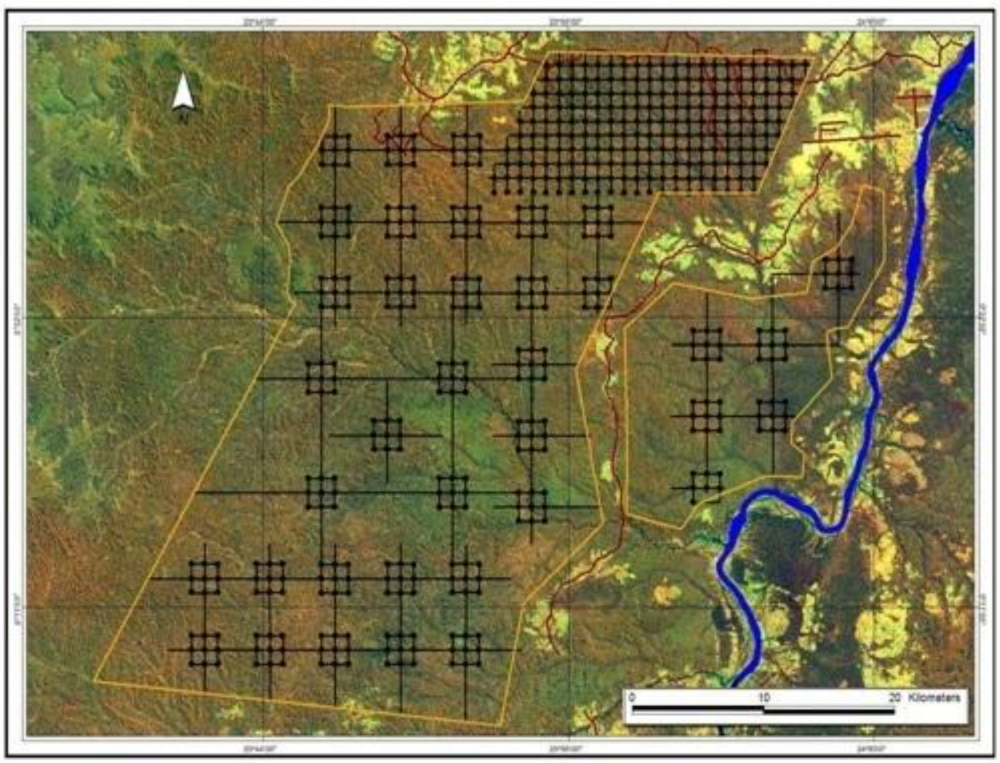

Figure 4 **Location of forest plots inside the project area. Locations were gridded to impose systematic sampling because of a lack of obvious forest stratification, and locations of groups of nine (9) sampling plots were chosen from a grid of sites to increase the extent of sampling to most of the project area.**

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Table 4 Example spreadsheet of a forest plot #131.

Tree #	Diameter (cm)	Est Biomass (kg)	CorrEstBiom (kg)	Est Leaves Twigs (kg)	Est Wood (kg)	Est C (kg)	Est No Trees	Est t C per ha
1451	12.6	75.92	83.27	11.71	71.56	35.78	198.96	14.16
1452	5.9	10.72	11.76	5.32	6.44	3.22	198.96	1.28
1453	20.9	280.14	307.27	19.83	287.44	143.72	16.24	4.64
1454	8.8	30.07	32.98	8.06	24.92	12.46	198.96	4.92
1455	5.1	7.36	8.07	4.57	3.50	1.75	16.24	0.04
1456	25.2	453.95	497.92	24.08	473.83	236.92	198.96	93.76
1457	24.8	435.59	477.78	23.69	454.09	227.05	16.24	7.32
1458	35	1,059.47	1,162.09	33.89	1,128.19	564.10	16.24	18.24
1459	149.5	44,871.13	49,217.27	153.43	49,063.84	24,531.92	7.96	388.36
1460	47.7	2,354.89	2,582.98	46.77	2,536.21	1,268.11	16.24	40.96
1461	63.3	4,886.68	5,360.00	62.77	5,297.23	2,648.62	7.96	41.92
1462	27.8	584.83	641.47	26.67	614.80	307.40	16.24	9.92
1463	25.8	482.36	529.08	24.68	504.40	252.20	16.24	8.16
1464	28.7	634.93	696.43	27.57	668.86	334.43	16.24	10.8
1465	21.8	312.33	342.58	20.71	321.86	160.93	16.24	5.2
1466	26.6	521.90	572.45	25.48	546.97	273.49	16.24	8.84
1467	50.6	2,742.21	3,007.82	49.73	2,958.09	1,479.05	16.24	47.8
1468	61	4,441.64	4,871.85	60.40	4,811.46	2,405.73	16.24	77.72
1469	56.1	3,578.63	3,925.25	55.36	3,869.89	1,934.95	7.96	30.64
Total		**67,764.75**	**73,387.05**	**684.73**	**73,643.60**	**36,821.80**	**1,014.52**	**814.76**

Procedure for Quantification of the Baseline Emissions and Removals
Land use and land cover strata were selected on the basis of their difference in carbon stocks and emissions, and in the activities that occurred in them.

Carbon stocks for forest strata were based on new allometric models of live wood for African trees (with an average wood density of 0.44 g/cm^2) by Djomo et al. (2010) on the basis of DBH only, with a residual standard error correction (exp(RSE^2/2)) for the fact that log-log regressions systematically underestimate the biomass of very large trees. This study found that height is often measured with considerable error and does not improve estimates of live wood biomass. Consequently, we used the following equation to estimate baseline carbon (kg) in the wood of a given tree *j*, BC_{ij} of forest stratum *i* (as tCO_2e, or tons CO_2 equivalent)

$$BC_{ij} = 0.11 * (DBH)^{2.58} * \exp(0.48^2/2) \quad (1)$$

where the number 0.48 was the residual standard error in Djomo et al.'s (2010) data set.

Standing stocks of carbon for plot *l* of forest stratum *k* were measured for each plot as the sum of the product of tree carbon density of tree *j* and the estimated density of trees implied by the encounter of tree *j*,

$$SC = \sum_j^n BC_j \delta_j \quad (2)$$

over all *n* trees in a plot. All measurements of forest stocks were made in the project area. The similarity of soils, elevation, water table, and topography in leakage belts and reference region to project area justify using the project area stock density for the same strata in the leakage belt and reference region.

Belowground biomass was estimated from the average root:shoot ratio for trees in primary tropical rainforest (Cairns et al. 1997, d'Oliveira et al. 2011) and in regenerating woodlands (Cairns et al. 1997, d'Oliveira et al. 2011) across a global range of studies. This ratio was found to average 0.192, for primary forest and 0.497 in woodlands and this mean was multiplied by aboveground carbon density to obtain belowground carbon density
Lying dead wood was measured following standard forest inventory protocol (Harmon and Sexton 1996, Keller et al. 2004) and converted to carbon density following the procedures in CDM Tool A/R AM Tool 14 "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" (Version 02.1.0) Analysis of forest carbon density across space revealed that two possible strata, wet forest and upland forest, did not differ significantly in their carbon density. Given that we could not separate wet and upland forests with sufficient accuracy in satellite images, we used the mean carbon density of upland and wet forests to estimate emission factors from deforestation.

Table 5 Key statistics on standing stocks of carbon in four land use classes.

A. Aboveground Live

Habitat	Mean	SD	N	SE	HW95%CI	Uncertainty
Wet Forest	192.62	69.26	230.00	4.58	8.97	5%
Upland Forest	181.85	73.24	80.00	8.24	16.15	9%
Woodland	13.34	3.65	5.00	2.11	4.14	31%
Cropland	3.38	-	NA	0.93	1.82	54%

B. Belowground Live*

Habitat	Mean	SD	N	SE	HW95%CI	Uncertainty
Wet Forest	34.67	13.08	9	4.62	9.06	26%
Upland Forest	32.73	12.34	9	4.36	8.55	26%
Woodland	6.67	0.72	6	0.32	0.63	9%
Cropland	3.15		NA	0.44	0.86	27%

* mean, SD, and SE of reported root shoot ratios in the literature, multiplied by mean aboveground carbon stocks from Table 5(A)

C. Aboveground Lying Dead

Habitat	Mean	SD	N	SE	HW95%CI	Uncertainty
Wet Forest	12.61	15.96	65	1.99	3.91	31%
Upland Forest	9.84	15.95	133	1.39	2.72	28%
Woodland **	0.00	0.00	0	0.00	0.00	0%
Cropland**	0.00	0.00	0	0.00	0.00	0%

** regenerated or regenerating habitats that lack significant woody debris

D. Total

Habitat	Mean	SD	N	SE	HW95%CI	Uncertainty
Wet Forest	239.90	NA	NA	6.80	13.34	6%
Upland Forest	224.42	NA	NA	9.43	18.48	8%
Woodland	20.00	NA	NA	0.00	4.18	21%
Cropland	6.53	-	-	1.03	2.01	31%

***Total SE (SET determined by formula for pooled SE's: $SE_T = (SE_A^2 + SE_B^2 + SE_C^2)^{0.5}$

G1.5 Communities Located in the Project Zone

According to government statistics and management's assessments, there are 33 villages in the project area with a combined population of approximately 100,000 –

150,000 inhabitants. The population is made up of indigenous tribal village-based societies of general Bantu heritage, with high linguistic diversity and strong loyalties to its villages and language groups.

The project runs in a region where the people use basic subsistence agricultural techniques. Over time, the fertility of the land wanes, and the people must move on to new areas of primary forest. The survival of the population depends solely on agricultural production. Despite using rudimentary tools and cultivation techniques, the population manages to sustain itself.

The socioeconomic needs of the villages continue to expand due to its population growth, the progressive introduction of technology and the influence of surrounding regions, facilitated by a large network of communication via the waterways. The population's response to these growing needs is to increase agricultural production by opening new fields. This allows unrestrained cutting of the forest and non-compliance with the timing of fallow plots.

Characteristics of the population as they relate to labor, land and other resources are described below:

<u>Labor</u>

Agricultural operations include clearing, thinning, burning, planting seedlings, maintenance and the harvest. Each operation is unique, requiring its own timelines and skill sets. Clearing free space in the forest to grow crops is characterized by removing grass, shrubs and other vegetation, except for the largest of trees. A relatively short period of time is required to clear primary forests with the owner of the field overseeing the clearing with the assistance of several men from the village.

Thinning essentially removes the shadow created by trees to promote the growth of other plants. This operation requires strength and is often carried out by the men in the village who come to work with the owner of the field. Burning typically occurs after thinning, and it serves to clean the soil and increases its fertility with the mineral material produced after the fire. Men often carry out the burning activities with the help of their family members. On fallow land with high biomass content, the fields burn very quickly and typically only require one or two repeated fires.

The women of the village have the primary responsibility for planting seedlings in the fields. They first sow rice, followed by beans, cassava, and finally, bananas and plantains. Women also primarily oversee the maintenance of the fields to remove weeds, which is particularly important for rice cultivation. This operation does not require much labor and is restricted to the household level. Women mainly perform the harvest as well, with this activity marking the end of the field cycle.

<u>Land</u>

For communities living in the vicinity of the project, the forest is the primary area for agriculture. Access to land is regulated by traditional law, which applies differently to the indigenous population than it does to non-Congolese. Access is obtained by hereditary inheritance (from father to son), alliance (marriage) or assignment, which is mainly the case for foreigners (see Section G1.6).

Villages or clans may find it necessary to seek new lands in response to changing circumstances. Some villages have no adjacent forestland and instead utilize remote properties within the forest. Authorities have at times displaced such villages living along the highway, forcing the people to abandon their properties within the forest and to settle on lands belonging to other villages. In other circumstances, population increase and scarcity/remoteness of forest land have caused some villages to fragment, with some clans leaving to occupy new land belonging to the less populated villages.

Resources

Households mainly use primitive tools (machetes, axes, etc.) and seed derived from previous crops. Financial remuneration is mainly "chappa", transportation costs, etc. "Chappa" can be understood as an amount allocated to the purchase of food and drink for people who help cut fields.

History of Jadora's Involvement with the Communities

The Isangi project is a collaborative effort that directly engages the 33 villages impacted by the program, in addition to those who have governance for the region (see Figure 5). Jadora first visited Isangi in 2009, when it entered into a corporate partnership to sustainably manage the Isangi logging concession's forest resources and the carbon pool. Jadora initiated its stakeholder engagement process immediately upon beginning data collection in the project area in 2009 and has maintained a steady on-the-ground presence in the project area since March 2010. Throughout this period, Jadora has established dialogue with local villagers, local and international NGOs, and the territorial, provincial, and national governments.

Additional information is available in the Appendix of this document.

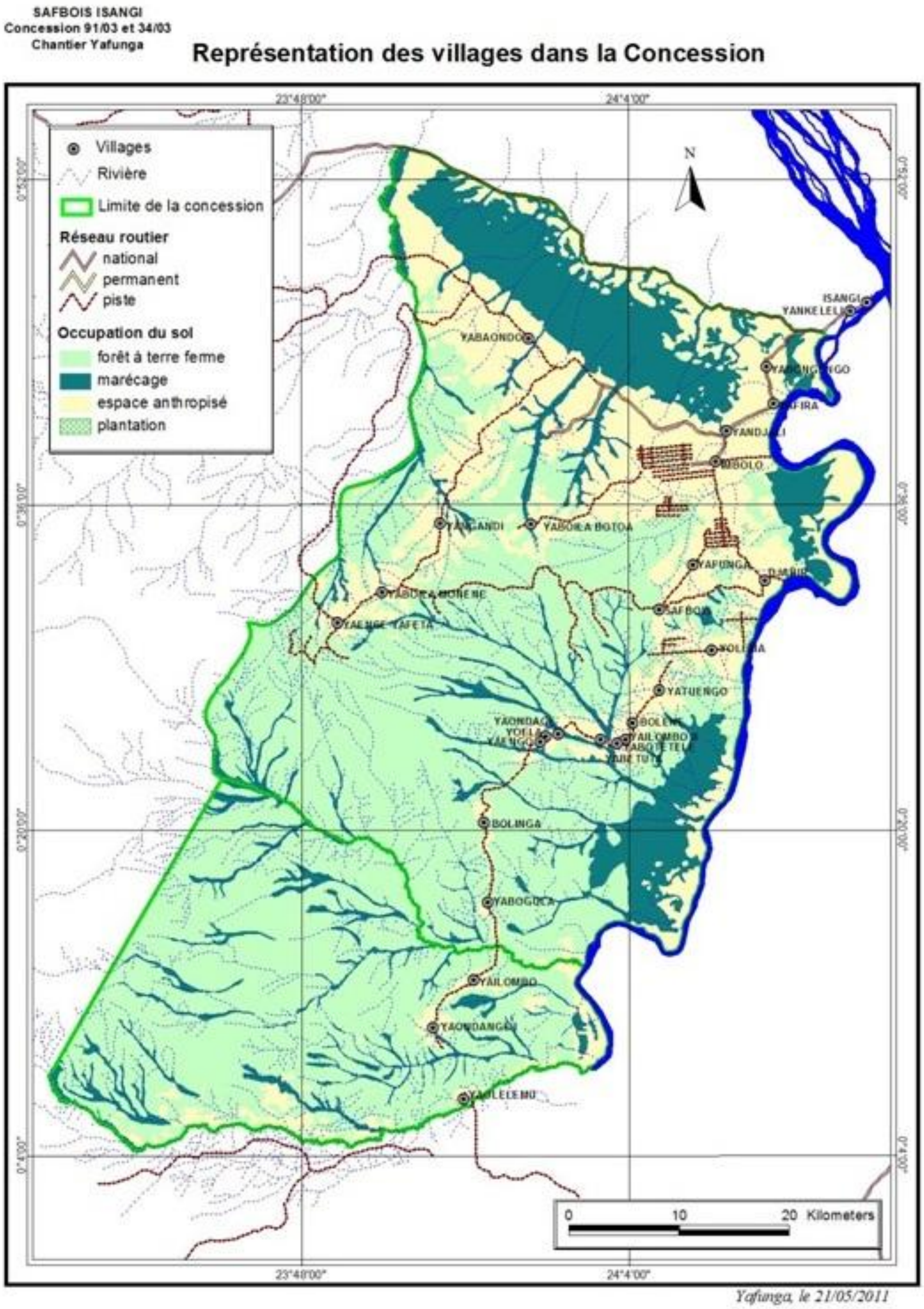

Figure 5 Map of major villages in the Isangi concession.

G1.6 Current Land Use and Land Tenure in the Project Zone

The land in the project area is owned by the government of Orientale Province of the RDC and occurs within a logging concession leased to Safbois. Traditional law has historically regulated forest management and access to land.

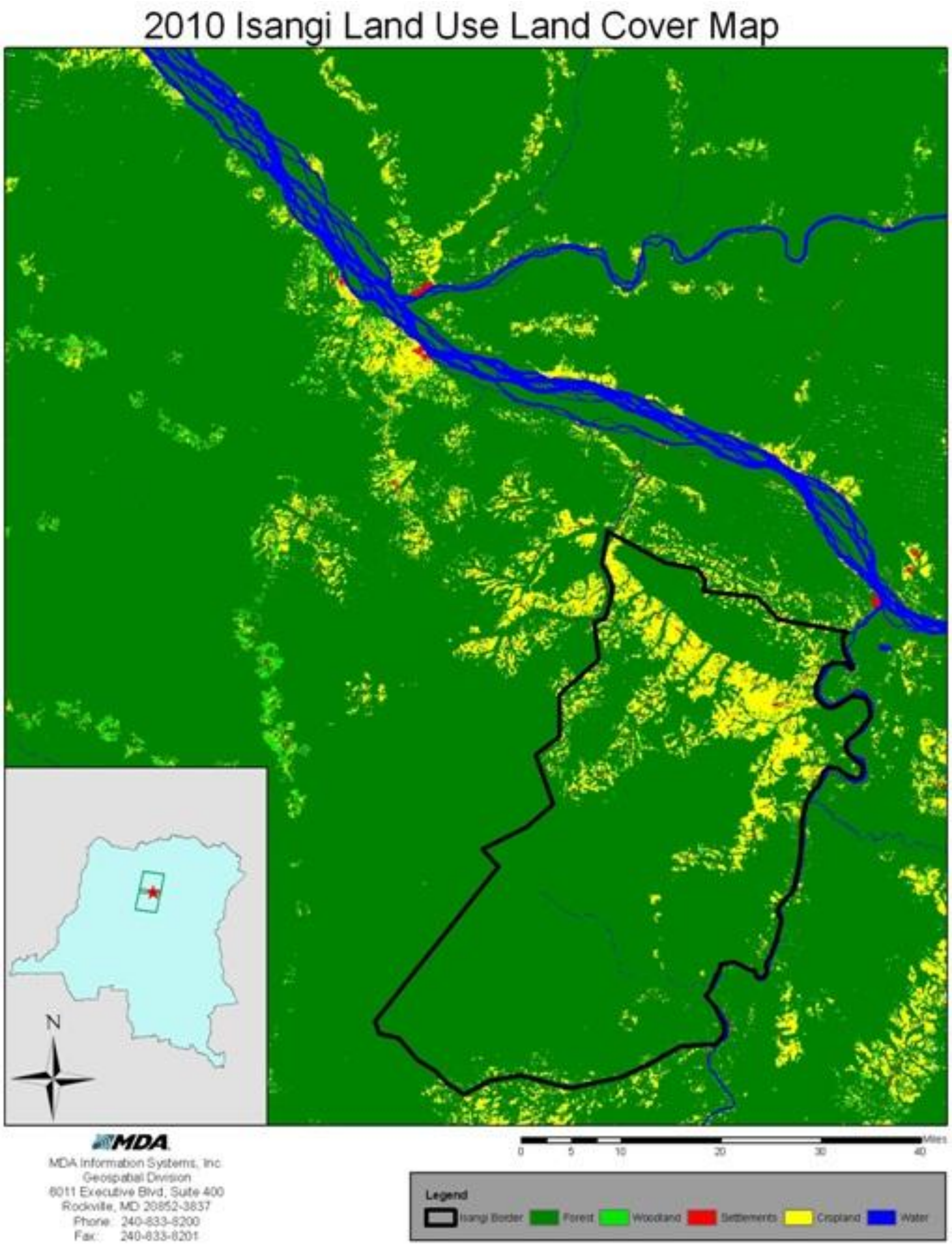

Figure 6 Location of the historical reference region in the RDC west and southwest of the Congo River near Kisangani used during the analysis of land cover change during the historical reference period. Logging concessions other than the host concession (black border) owned by Safbois, and protected areas were excluded from the analysis.

Traditional Land Rights
The forest as a whole belongs to the community. The guarantor is the village chief, and he may give tracts of land to his children's clans. The land, therefore, cannot be sold but only allocated for one or more cropping seasons. Additionally, the land may not be left to a woman because, according to local customs, if she marries this capital is lost (the land will go to another clan or the husband's village).

At a higher level, the head chief is the guarantor of all the land in his area (villages and groups). He regulates land use and manages conflicts between the villages regarding the forest. In each clan, the land is managed by the capitas (clan chiefs) who grant each family its portion of forest to be exploited. Each household has approximately one to ten hectares, divided into fields left fallow and fields under operation. If existing fields are no longer productive, the village may expand its agricultural activities into the primary forest. The elders open a field in the primary forest and bequeath the fields leftover to the village youth, who traditionally don't have the authority to cut primary forest.

Historical and Current Land Use
Safbois has conducted low-impact selective logging of mature trees for the decade prior to the implementation of the REDD project on the Isangi concession. Larger-scale forms of logging, such as clear-cutting for raw lumber or pulp are not economically feasible due to the lack of suitable roads and the infeasibility of transporting large volumes of wood on the Congo River.

The project area featured the following major uses over the ten (10) years prior to the start of the project**:**

- Selective Logging – The land in the project area was either open, government-owned land or land leased to private companies as a logging concession. The concession was used exclusively for selective logging of two species: *Pericopsiselata* (Afrormosia) and *Chlorophora sp.* (Iroko). This restriction on logging was in response to the cost and difficulty of moving large volumes of timber down the Congo River, which is the only transportation artery available in the region for moving bulk materials to the capital Kinshasa.
- Subsistence Agriculture – Subsistence farmers, following traditional practices, periodically cut down forest in order to provide land for annual crops. People have cleared the forest from approximately 14% of the Reference Area, and 5% of the Project Area over the past 60 years. Forest clearing occurs on about 0.1% of the forest each year.
- Plantations – A very small fraction of previously cleared land has been converted to plantations. Plantations are typically small scale (< 0.5 km^2) and their products are channeled to local markets, primarily due to the lack of sufficient transportation arteries to broader markets. The main type of small-scale plantations use palm oil trees in which the fruits are harvested for food or oil production.

G1.7 Current Biodiversity within the Project Zone

In both the Upland Forest and Wet Forest systems, the tree canopy is approximately 45-60 meters in height, as determined by measurements with clinometers during forest inventory sampling. The understory primarily consists of species of canopy trees yet to reach mature height in combination with ferns and other epilithic species. Throughout the forest, lianas reach up to 30 centimeters in diameter and traverse the trees from the forest floor to the canopy with ferns and other epiphytes covering older vegetation.

Diversity in Orientale Province

There have been no previous studies of biodiversity within the project area. The Congolese National Herbarium in Yangambi/INERA has one of the most complete sets of collections of vascular plants in the Congo River Basin. This collection however is not specific to any one location and personal communications with the herbarium staff indicated few if any collections from within the project area.

In 2010 a major European initiative (*Boyekoli Ebale Congo 2010)* to study the Congo River and its surroundings was undertaken. The expedition traveled from Kinshasa to Kisagani. Their primary work was in Orientale province. They have released their preliminary data (www.natuurwetenschappen.be/common/.../Results_24_01_2011.pdf*)*, but a complete analysis has not been published. The *Boyekoli Ebale* survey conducted a workshop in Kisangani in which their preliminary results are discussed (http://www.congobiodiv.org/en/content/presentations-workshop-kisangani). For each taxonomic group studied, new species were discovered in the region. Given how close the study was to the project area, the information they collected is directly relevant to the Jadora-Isangi REDD project.

To the west and southwest of the project area the Bonobo Conservation Initiative is active. Personal communications with their staff have indicated that the project area is a potential habitat for Bonobos.

Diversity in project area

Floral Diversity:

The project has not completed a systematic survey of the floral biodiversity of the project area. The floral diversity is typical of rainforest systems around the globe with high levels of taxonomic diversity. Despite a recent rapid biological assessment in the RDC and the presence of Yangambi/INERA in the province the complete flora of the project area remains unknown due to lack of sufficient comprehensive studies.

The project is in direct and continuing contact with the National Herbarium of the Congo (Yangambi–INERA) that has recently undergone a series of improvements with the assistance of the Belgium government (National Belgium Botanical Garden/Dr. Steve Dessein - steven.dessein@br.fgov.be). Discussions are under way to work with Elasi Ramazani (Head of the Deparment - Yangambi - elasi_ramazani@yahoo.fr) the Herbarium/INERA to develop comprehensive studies of the project area that will support both the Isangi REDD+ Project as well as the Congolese National Herbarium.

Previous forestry operations in the Orientale province have identified 394 tree species as occurring within the intact primary rainforest. Based on the list provided to Jadora, the Isangi Project has observed 270 tree species in our forest carbon plots (the project has surveyed 68 square hectares). One vascular plant species that is CITES listed (*Pericopsis elata)* is known to occur within the project area. Identification of lianas, herbs and epiphytes has not yet been possible.

Additional information is available in the Appendix of this document.

Faunal Diversity
Jadora has instituted a program to assess the faunal diversity within the project area. The techniques used (See SOP for Faunal Diversity) are the same as used by the Conservation International Rapid Assessment Program (Conservation International 2011). The Jadora staff that conduct the faunal surveys have lived their entire lives within the project area and have spent decades hunting and tracking animals. Their substantial and locally honed meta-taxonomic skills have been supplemented by extensive discussions and training with Joe Wasilewski on animal identification. The training for animal identification has been conducted by locally trained hunters and university trained biologists. The teams have been trained in GPS usage, trap cameras, general data collection protocol and how to use wildlife identification field guides.

Additional information is available in the Appendix of this document.

Up until July 24, 2011 approximately 972 survey hours had been spent assessing the project area using the transect methodology. Since August 2011 the quadrat methodology has been used, but the data has not been assembled for analysis.

Table 6 Biodiversity survey hours and locations.

Team chief	Team member	Date	Person Hours	Hrs	Min	Sec	Hrs	Min	Sec
Bonama Bausa	Malokota Mosolo	4/25/11	20	0	12	5.7	23	51	26.8
	Lituambela Lisendja	4/26/11	26	0	12	6.2	23	49	54.5
	Bangendji Imbele	4/27/11	26	0	12	5	23	48	52
		4/28/11	24	0	12	2.5	23	48	56.8
		4/29/11	16	0	12	3.8	23	46	50.1
		4/30/11	26	0	12	4.6	23	46	32.8
		5/1/11	24	0	12	7	23	45	4.6
		5/2/11	16	0	12	2.6	23	43	12.8
		5/3/11	28	0	11	54.3	23	43	23
		5/4/11	24	0	12	1.9	23	43	7.8
		5/5/11	36	0	12	18.8	23	51	47.3
		5/7/11	26	0	12	36.9	23	51	55.7

Team chief	Team member	Date	Person Hours	Hrs	Min	Sec	Hrs	Min	Sec	
		5/8/11	16	0	12	23.3	23	52	5.4	
		5/9/11	20	0	12	18.7	23	51	45.9	
		5/10/11	20	0	12	24.8	23	51	32.6	
		5/11/11	20	0	12	50.5	23	50	46.7	
		5/12/11	16	0	12	33.4	23	50	47.6	
		5/13/11	18	0	12	30.6	23	52	10.8	
		5/14/11	16	0	12	29.2	23	52	0.3	
		5/15/11	26	0	12	22	23	51	55.3	
		5/16/11	16	0	12	51.5	23	55	41.8	
		5/17/11	18	0	12	49.4	23	54	9.5	
		6/4/11	24	0	31	40.5	24	3	45.8	
		6/10/11	22	0	31	30.2	24	4	14.6	
		6/13/11	20	0	31	12.2	24	4	13.9	
		6/14/11	22	0	31	21	24	4	43.6	
		6/15/11	20	0	30	37.8	24	4	13.6	
		6/17/11	16	0	31	48.7	24	3	27.3	602
Bonama Bausa	Lituambela Lisendja	7/13/11	13.5	0	30	44.6	24	4	47.6	
	Lito Lofungola	7/15/11	15	0	30	54.3	24	4	28.9	
		7/16/11	6	0	31	48.3	24	3	28.2	
		7/18/11	10.5	0	31	23.1	24	4	13.9	
		7/19/11	9	0	31	48.3	24	3	23.2	
		7/22/11	18	0	31	38.2	24	1	59.7	
		7/23/11	15	0	20	58.9	24	0	54	
		7/24/11	15	0	28	12.1	24	0	56.6	
		7/25/11	18	0	23	42.9	24	1	4.3	120
Balilo Geli (Baris)	Namabo Bosego	6/20/11	22	0	29	49.1	24	5	33.7	
	Lialila Kamanda	6/21/11	22	0	29	35.3	24	5	36.5	
		6/27/11	22	0	30	34.6	24	3	42.9	
		7/13/11	12	0	30	27.9	24	4	47.6	
		7/15/11	15	0	30	31	24	4	47.7	
		7/16/11	16.5	0	31	49.1	24	3	45.5	
		7/18/11	12	0	31	44	24	3	47.7	
		7/19/11	9	0	30	54.2	24	4	28.9	
		7/22/11	15	0	31	38	24	1	59.7	
		7/23/11	16.5	0	27	42.5	24	0	53.8	
		7/24/11	13.5	0	28	5.6	24	0	41.5	175.5
Malokota Mosolo	Bangendji Imbele	7/15/11	15	0	30	36.8	24	4	47.6	
	Ganakombe Mayaka	7/16/11	13.5	0	37	3.4	24	3	19.9	

Team chief	Team member	Date	Person Hours	Hrs	Min	Sec	Hrs	Min	Sec	
		7/18/11	10.5	0	31	55.2	24	3	14.2	
		7/19/11	7.5	0	31	55.2	24	3	14.2	
		7/22/11	15	0	27	28.5	24	0	47	
		7/23/11	16.5	0	27	32.9	24	0	48.8	
		7/24/11	16.5	0	27	38.2	24	0	51.3	94.5
TOTAL SURVEY HOURS										**992**

The faunal diversity assessment teams have identified 85 species of animals, of which 16 are either REDlisted or listed by CITES within the project area. Throughout the project area the faunal species live in a natural intact environment with no inhibitions to migration, feeding or reproduction. A network of rivers and streams that harbor an undetermined level of aquatic diversity form a series of watersheds throughout the project area.

The primary threats to biodiversity are frontier deforestation from surrounding villages for subsistence agriculture and hunting for the bush meat trade. Deforestation rates are determined using GIS technology and SPOT imagery in conjunction with forest monitoring teams.

G1.8 Project Site High Conservation Values

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

Approximately 92% of the project area is of High Conservation Value and supports numerous faunal species that are of global importance (i.e. *Pantherus pardus).* Despite being under threat from hunting, all of these species continue to sustain fully viable breeding populations.

The designation of the project area as having HCV is based on an analysis of the project area using the criteria outlined in the HCVF ToolKIt. Information for the analysis came from discussions with local villagers, on the ground assessments by Jadora personnel, literature review, and available conservation databases.

HCV 1: *Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values*

HCV 1.1 Protected areas

HCV1.1.1: There are no protected areas within the project area.

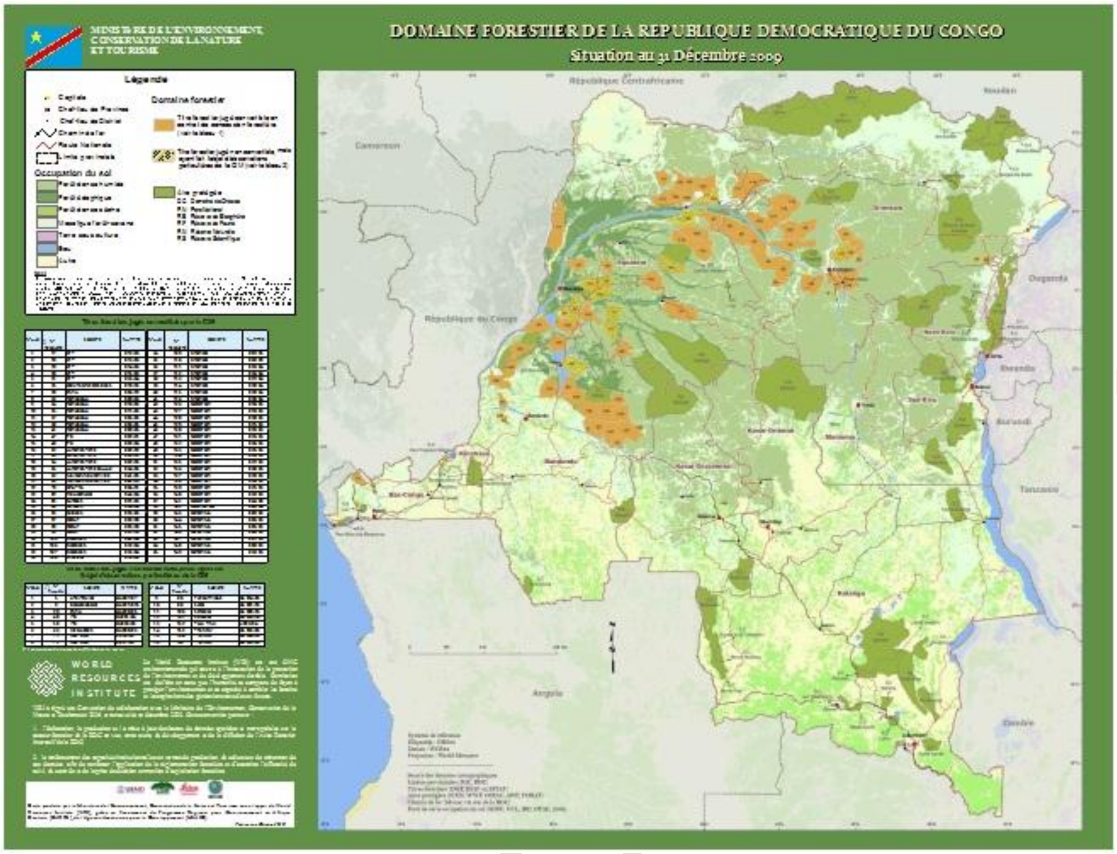

Figure 7 Map showing all protected areas (in olive green) and logging concessions (Tan) in the RDC. Safbois concessions are #'s 85 and 86.

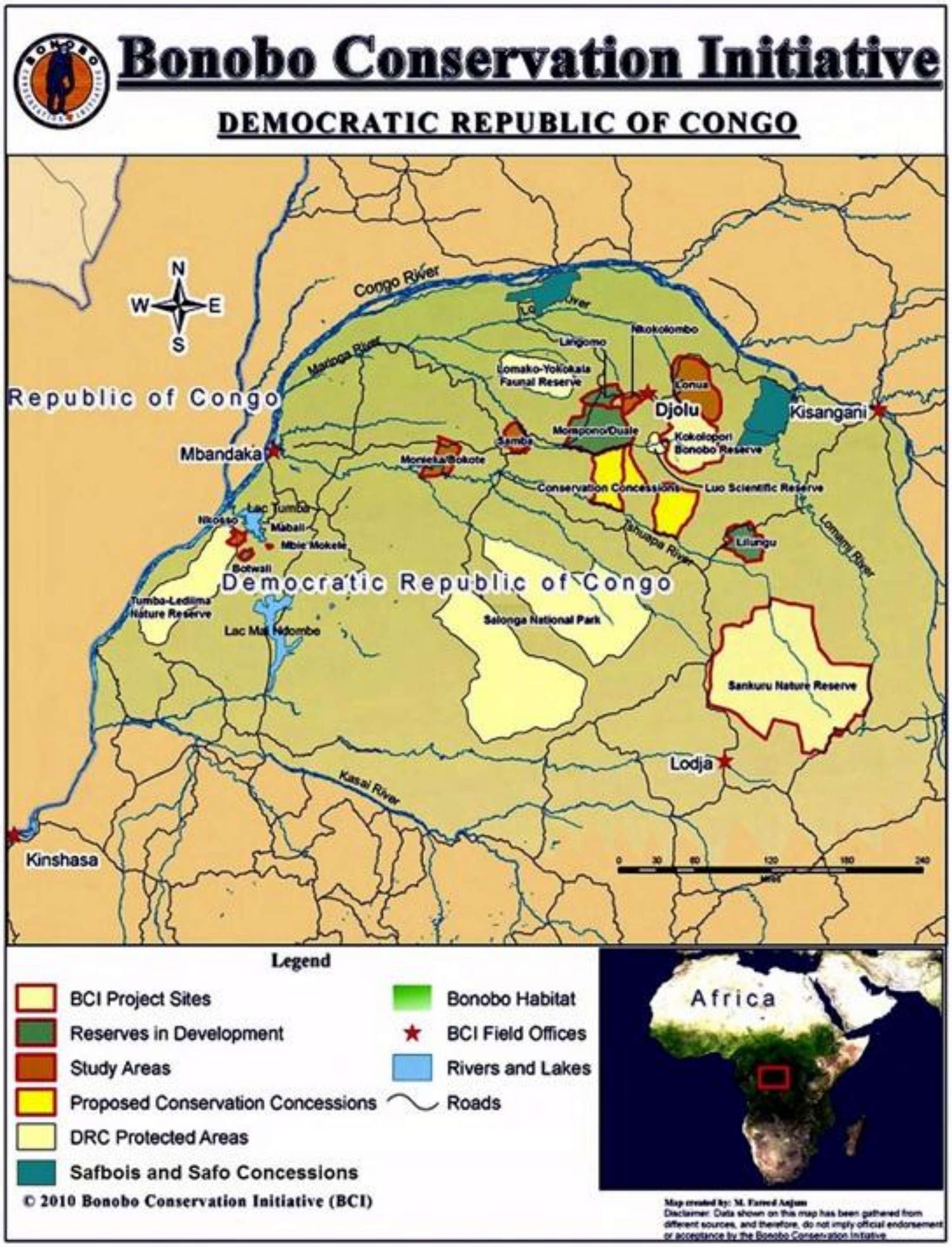

Figure 8 Map produced by BCI and modified by Jadora. The Jadora REDD+ project is in blue next to Kisangani.

HCV1.2-1.4: Threatened and endangered species, endemics and temporal concentrations

HCV 1.2.1: The project area has not been designated a priority site for threatened or endangered species, endemics or maintaining significant temporal concentrations of species.

HCV 1.2.2: The Congo River Basin is considered internationally to be a conservation priority region (www.panda.org, www.unep.org). The project area is within the Congo River Basin.

HCV 1.2.4: The project area contains breeding populations of *Pantherus pardus* (Leopards) (Figure 8). There is evidence the area was once inhabited by forest elephants, and remnant individuals may still live within the forest (Figure 9) Information was obtained from the project area from local hunters, actual animals that have been hunted and caught, and fossil evidence presented to Jadora personnel.

The floral diversity is substantial but has not yet been fully characterized or studied. While only one CITES-listed species exists, the possibility of unknown and endemic species occurring within the project area is high.

HCV 1.2.5: The project area has 16 REDlisted or CITES listed species (see appendix of faunal species identified in rapid surveys). The project area has not been identified as a forest of outstanding importance.

Ninety–two percent of the project area is intact primary forest that is not degraded compared to surrounding areas to the North, East, and West. There are, however, villages within the project area boundaries that are actively farming. There are no exotic plantations in the project area, and the western edge borders a forest that is contiguous with the Kokolopori Bonobo Reserve.

HCV 1.2.6: The project area is an important breeding and feeding area for *Pantherus pardus* (Leopards).

HCV 2: *Forest areas containing globally, regionally or nationally significant large landscape level forests*. The information sources are satellite imagery, on the ground field observations, and interviews with villagers.

HCV 2.1: The project area is over 261,500 hectares of which 240,000 hectares (~92%) are contiguous intact primary forest landscape.

HCV 2.2: The HCV area is critical to maintaining the priority landscape. The project area is very large (over 100,000 hectares and contains no plantations of exotic species).

HCV 2.3: The HCV area is part of a larger level landscape.

HCV 2.4: The project does not have protected status within the country. The area is less affected by recent human activities and contains mostly (~92%) intact primary forest with natural disturbance patterns, composition structure and habitat and contains at least one top predator (*Pantherus pardus* (Leopards)).

Figure 9 Juvenile Leopard killed in December 2011 near Yaenge Yafeta.

Figure 10 Image of old forest elephant teeth found within the project area.

HCV 3: *Forest areas that are in or contain rare, threatened or endangered ecosystems*

HCV 3.1: The Congo River Basin is considered internationally to be a priority site for ecosystem conservation (www.panda.org, www.unep.org, Mittermeier *et al.* 1998, Olson DM, Dinerstein E. 1998). The project area is within the Congo River Basin.

HCV 3.2: The project area contains lowland tropical forests that are threatened globally.

HCV 3.3: It is not currently known if the project area contains any forest types that are rare, threatened, or endangered.

HCV 3.4: Any rare threatened or endangered ecosystems that exist within the project area are not currently protected, are not degraded, and exist in large contiguous areas.

G1.8.2 Significant Landscape-Level Areas with Natural Species Concentration Composition

All species within the landscape boundaries occur in their natural patterns, distributions, and abundances.

G1.8.3 Threatened or Rare Ecosystems

While not in any immediate threat of extinction, the area of tropical rainforest habitat is in decline throughout the world. The Isangi REDD Project will add to the global effort to curb the loss of rainforest and the biodiversity it contains.

G1.8.4 Areas with Critical Ecosystem Services

The entire project area is part of the watershed that feeds into the Lomami River and eventually to the Congo River. It acts as a buffer against flooding and siltation by retaining water for extended periods before it is released to the river system. It also acts to reduce siltation by stopping the flow of muddy water from farmlands into the river system. Fire is not an issue or problem in this system.

G1.8.5 Areas Fundamental to Meeting the Basic Needs of Local Communities

The entire project area is fundamental for the basic needs of local communities by providing protein sources and fuel material as well as housing and construction materials.

G1.8.6 Areas Critical for Traditional Cultural Identity of Communities

Each village system has areas that are designated as “sacred” areas that exist within the project area. The size and location of these spaces varies between villages. They are not well defined geographically, but participatory mapping sessions in the communities have allowed us to form a general idea of their locations in respect to each village. The participatory maps created at the project site are very large, and we are not able to scan them for inclusion in this document. The maps will be provided to the validators upon their site visit.

G2 Baseline Projections

A baseline projection is a description of expected conditions in the project zone in the absence of project activities. The project’s impact will be measured against this ‘without-project’ reference scenario. Baseline conditions involve mainly deforestation for subsistence agriculture, with charcoal production a byproduct of agricultural and clearing, plus emissions from the removal of timber through selective logging by large logging corporations. Social, economic, cultural and motivations of deforestation and degradation agents in the Congo Basin reflect these two main drivers of carbon emissions.

G2.1 Baseline Land Use

The only feasible future scenario in the absence of the project is continuation of the preproject land use as logging concession. The project proponent has not attempted to slow the conversion of forest to subsistence crop or plantation agriculture because the cost of forest protection would have exceeded logging revenues. Forest protection is not economically viable without carbon funding and is likely to continue in the Project and Reference Areas. Over the ten (10) years prior to the start of the project, the project area featured major uses such subsistence agriculture and palm oil plantations in addition to selective logging.

Continued clearing of forest and selective logging is evidently the most likely baseline scenario, as it has been carried out routinely throughout the Reference and Project areas. Forest clearing for agriculture provides the greatest economic benefit for individual farmers and their families, while selective logging, which accounts for 75% of initial baseline forest degradation and deforestation, remains the most profitable option for concession-holder Safbois. In the near future, subsistence agriculture would likely replace logging as the main driver of deforestation as the human population grows.

We performed a three-step evaluation of the drivers of deforestation and degradation in the project area, as per requirements of the VCS VM0006 methodology.

1. <u>Identification of drivers of deforestation and forest degradation</u>
   We identified the following potential drivers of deforestation and degradation that occur in this region of the RDC.
   a. Clearing for subsistence farming
   b. Wood harvest for the manufacture of charcoal.
   c. Clearing to establish commercial plantations (primarily palm oil).
   d. Commercial logging.

2. <u>Assessing the relative importance of the drivers of deforestation and forest degradation</u>.

   <u>Deforestation.</u> From satellite image comparisons used in calculating changes in forest cover between 2009 and 2010, we identified 70 locations where deforestation occurred in the project area. We found 40 instances of recent (< 2 yr old) deforestation in our 339 ground truthing waypoint data set. Of these 40, 34 were young farms or clearings scheduled for farming, and only 6 were young palm oil plantations. Interviews of villagers from the closest villages revealed that none of the recent clearings were made solely to obtain charcoal, though farmers did make and sell charcoal from downed trees otherwise felled to clear fields for agriculture. Also, none were sites of commercial logging. Overall, the most important drivers of deforestation in the project area are clearing forest for subsistence agriculture (85%) or palm oil plantations (15%). Consequently 100% of deforestation was driven by conversion of forest to cropland or settlements and the conversion of these to woodland as farms are abandoned when soil becomes depleted.

The drivers of deforestation result in the following carbon (not CO_2e) loss from different transitions, assuming 452 hectares of forest converted to non-forest in 2009-2010 (Table 7).

Table 7 Carbon loss (not CO_2e) due to different land cover transitions in the Isangi Project Area, 2009-2010.

Transition	Area (ha)	Carbon Lost (metric tons)
Forest to Cropland	262	58,540
Forest to Settlements	111	24,801
Forest to Woodland	79	17,651
Total	**452**	**100,992**

All of these losses count as deforestation and all are driven by clearing for agriculture by two agents, with 15% attributed to clearing for plantations by plantation companies and 85% clearing by smallholder farmers.

Degradation

Commercial logging. Virtually all commercial logging in this region of the RDC is selective logging for relatively few (< 40) species, and the techniques for removing these trees seldom leads to large-scale clear-cuts that would be detectable as forest removal from remote sensing (Congalton 1991, Bryan et al. 2010). Selective logging removes approximately one large (> 60 cm dbh) tree per ha from designated logging areas (approximately 4000 ha/yr total on the project area under baseline conditions) plus removal of smaller trees to create a path for removing cut trees. The resulting diminution of the canopy and of the total carbon stock/ha on logged areas is less than 3% of the average difference in carbon stock between forest and either cropland or settlements (250 tons/ha, Table 5 in section G2.3)

Charcoal production. Interviews with villagers in social surveys show that forest clearing requires considerable effort and almost never occurs for the sole purpose of generating wood for charcoal production or for home construction. The effort to clear forest is expended only when the cleared area can be farmed and downed logs can be converted to housing and charcoal. Charcoal production is not conducted in the project area by organized companies because the majority of target locations are too far from transportation to gain from transporting large quantities of charcoal in bulk vehicles.

3. Identification of the quantitative driving variables related to the agents and drivers of deforestation and forest degradation

Deforestation to support subsistence agriculture is influenced mainly by proximity to people and transportation routes for products from smallholder farms. An analysis of the influence of different variables on deforestation probability is given in section G2.3.5. The analysis shows that a logistic model, derived empirically by determining whether randomly selected classified forest pixels were converted to nonforest by 2010, and matching this fate to measures of distance from key landscape features (roads, rivers, villages, forest edge) for each pixel.

Plantations are not likely to contribute to future deforestation because plantations are usually established on degraded land and not in newly deforested land and because the project area is too far (> 50 kilometers over poor roads) from the Congo River (Perex et al. 2006). Any new plantations are likely to be established only on the already degraded land in the northeastern portion of the leakage belt and no new ones are likely to be established any farther from the river.

Consequently, the principal driver of future deforestation in the project area and leakage belt is subsistence agriculture by the agent of smallholder farmers. The rate of deforestation is therefore likely to be driven by increasing population pressure in the region driven by high birth rates (social surveys reveal that children comprise at least 50% of the human population in the project zone (leakage belt and project area) and in-migration. Movement of people into the region has occurred in the past five years following the cessation of civil war in the RDC, and is already reflected in the rapid increase in deforestation rates between 1999-2002 and 2009-2010 (see section G2.3). Families typically have so few possessions that they can easily travel 20-30 km/day on foot, and certainly farther on motorcycles. However, social surveys suggest that the main limit to the establishment of new farms, and thus deforestation, is obtaining permission from village chiefs. This limit is political and not geographical, and is likely to be affected much more by access to and demand for services within a village.

Degradation Future degradation will likely become a negligible contribution to GHG emissions in the project zone, as Safbois, S.P.R.L., one of the project proponents, plans to cease logging in the project area per VCS VM0006 methodology requirements. The vast majority of charcoal harvest by smallholder farmers occurs after the clearing of forests, and thus deforestation. No other agents are now or likely to be imposing forest degradation.

G2.2 Additionality

We evaluated additionality of the project with investment analysis and common practice analysis.

Investment Analysis – Simple Cost Analysis

Alternative Activities

1. Full-scale selective logging of 32 commercially valuable tree species. This activity generates a net profit, as determined from Safbois Profit and Loss statements, of around 15%. Based on evaluated costs and effectiveness (or lack thereof) of patrolling perimeters of protected forests (Bray et al 2008), preventing forest clearing for subsistence agriculture would result in unprofitable logging enterprises.
2. Limited selective logging of the four most valuable timber species entails virtually

similar costs as logging 32 species because of the fixed costs of crews, equipment purchase and depreciation, and transportation of products. The reduced income would result in a net loss of $360,000 USD annually, as determined from Safbois Profit and Loss statements.

3. Subsistence agriculture. This activity typically supports one or a few families and provides an annual per adult income of $300 USD in our project area from the sale of crops and charcoal manufactured from timber downed to clear fields. Because such income is gained from local markets and the majority of products are consumed for subsistence, this activity faces no economic barriers, and, with the increase in political stability in the RDC, is the most likely baseline scenario.
4. Tourism. Forest conservation could hypothetically be funded by tourism, but there is no current tourism infrastructure on the south bank of the Congo River and the largest town of Yafunga is one day’s rough travel from the nearest airport in Kisangani. The remoteness of the area and history of instability in the RDC makes tourism infeasible as a conservation activity.

Adding the cost of forest protection against the main deforestation driver, conversion of forest to cropland, would render the selective logging operation unprofitable and therefore infeasible. In the absence of active protection, both physical and that created by partnering with the communities to create economic alternatives, it is clear the land in the project area would be cleared aggressively for subsistence agriculture, as that is happening on the concession property already. The lack of tourism transport and hosting infrastructure keeps ecotourism as an infeasible option as well.

Common Practice Analysis

The common practice land uses in Central African rainforest are:

1. Selective logging
2. Clear-cutting to establish plantations, mostly of palm oil trees
3. Clear-cutting to support subsistence agriculture
4. Establishment of government and donor-funded conservation reserves

Selective logging activity in central Africa occurs by connecting areas of forest with desired tree species to transportation hubs with logging roads. Trees removed are usually only large specimens (> 70 cm diameter) of a small portion of available species, generally 2-32 species on a multi-year year rotation. Logging concessions generally expend no effort to curtail clear-cutting to support subsistence agriculture and may vacate their concessions, despite the fact that selective logging may encourage increased activity of subsistence farmers and bush meat hunters associated with logging roads (Foley et al. 2007, Broadbent et al. 2008).

Clear-cutting to establish plantations, mostly of palm oil trees was implemented on a limited basis in the late 1990’s and early 2000’s, but we found only one plantation started since 2005 in our 331 point survey to ground truth remote-sensing based stratification procedure. Perhaps the long transportation route for palm oil (downriver on barges) has discouraged further development. Based on these field data, forest clearing to establish plantations is not common practice in this region of the Congo.

Clear-cutting to support subsistence agriculture is the dominant and most common form of land use in this region of the Congo (Broadbent et al. 2008) and therefore qualifies as common practice.

Establishment of government and donor-funded conservation reserves is common practice as a means to protect wilderness in Africa, and to provide sustainable development support for rural African communities, but that common practice is typically funded by governments or donor agencies, and not by financial return from the project activities.

Based on these criteria, it is not common practice for private companies – such as Safbois – to protect forested wilderness in Africa for financial return in the absence of carbon revenues. The Isangi REDD Project, conducted as it is in an area designated for logging is one of the first of its kind in African rainforest regions and in the République Démocratique du Congo.

In summary,

- The Isangi REDD Project is not the only credible alternative land use consistent with enforced mandatory applicable laws.
- One of those alternative land uses, that of subsistence agriculture, is by far the most likely baseline land use.
- The Isangi REDD Project passes the Investment Analysis Test, as it is not a financially viable land use without the AFOLU VCS project revenues.
- The project activities are not common practice.

G2.3 Carbon Stock Changes

In this section we show how land use/cover in the project area and reference region is classified and the transitions between different land use/land cover types, as determined by interpretation of a series of Landsat TM images dating back to 1999. Specifically,we show and how avoidance of increases in the rate of conversion of forest to non-forest uses, coupled with anticipated continued selective logging lead to reduced emissions from the project area. Emissions from gases other than CO_2 account for less than 5% of emissions under the baseline scenario and are ignored.

G2.3.1 Description of LULC Class and Forest Stratum

Both the reference region and project area had the same strata. These have the following descriptions:

Wet Forest	Primary or secondary growth forests that are inundated at least one month per year, but are not inundated sufficiently to develop peat soils and thus be classified as swamp
Upland Forest	Primary or secondary forest that is not inundated more than one month during the year and typically has one or more trees with a diameter greater than 50 centimeters.
Woodland	Low growing trees < 3 meters in height or woody shrubs, indicative of regenerating forest.
Cropland	Open areas lacking in trees; used for growing annual/perennial food plants.
Water	Significant bodies of open water associated with the many large navigable rivers in the region.
Settlement	Villages, towns or cities.

Land transitions include:

- Forest to woodland implies clearing of primary forest followed by rapid regeneration within the period over which land use change is assessed.
- Forest to cropland implies clearing of primary forest.
- Cropland to woodland implies forest regeneration, though degradation of such regenerating forest by small-scale fires, grazing animals and charcoal makers may limit the potential of such a transition.
- Woodland to cropland implies re-cultivation of land fallowed for less than four (4) years.
- Woodland to forest implies a transition from secondary succession to secondary forest, which may approach primary forest in above ground carbon stocks.
- Cropland to forest implies rapid regeneration to secondary forest.

G2.3.2 Remote Sensing-Based LULC Classification

Satellite images of the initial reference region were initially subject to a supervised classification to identify forest, woodland, cropland, settlements and water. The woodland class included plantations. Classes were derived from a hierarchical unsupervised and then supervised classification of Landsat imagery followed by a separability test. The supervised classification was trained by visual inspection of high resolution SPOT imagery from Google Earth and evaluated with 887 ground data points (339 waypoints plus 548 forest inventory plots). The five classes were identified with > 90% overall accuracy (see section G1.2) and had average separability scores > 1700 as recommended for ERDAS Imagine separability test.

a. LULC class and forest stratum map of each image in the historical reference period. At the origin of this project, we chose a reference region that included areas mostly to the south and west of the project area. This region may soon contain other REDD carbon project areas, though these are not yet defined. To optimize the placement of a reference area relative to other potential REDD projects. To maximize consistency with our chosen methodology, VCS-VM0006, most of this region is not included in our project reference region, which extends eastward from the Lomami River north and east to the Congo River. However, methodology VCS VM0006 allows that the project reference region and the historical reference region can be different.

b. Accuracy assessment was performed on both the 2010 LULC map and Forest versus Non-Forest (FNF) map by calculating classification error matrices (see section G1.2). Overall accuracy, commission, and omission errors were determined according to Congalton (1991) and are summarized in Table 3. Overall accuracy for the 2010 LULC is 93.4% with a Kappa statistic of 0.8841. Most disagreement occurred between the woodland class and all other LULC classes. Water and Forest classes had the highest commission and omission errors indicating that these classes are the most reliable in terms of map accuracy.

c. Overall areas (hectares) of deforestation, degradation, and regeneration for each sub-period. We are primarily interested in establishing credits for deforestation derived from land use change driven by forest clearing for crop agriculture. Woodland represents areas undergoing regeneration, and thus changes from woodland to forest and from crops to woodland represent regeneration. Deforestation represents the transition from forest to woodland or cropland.

Table 8 Area (hectares) of initial reference region that converted from cropland or forest to woodland (regenerated) and that converted from forest or woodland to cropland (deforested) in three evaluation periods (1999-2002, 2002-2005 and 2005 – 2010).

A. 1999-2002		1,999				
2,002	**Cropland**	**Forest**	**Settlement**	**Woodland**	**Water**	**Totals**
Cropland	4,151	5,057	2,544	2,544	11	14,307
Forest	15,363	973,451	157	18,323	17	1,007,311
Settlement	213	958	350	350	2	1,874
Woodland	2,546	47,707	5,878	5,878	36	62,045
Water	35	21	75	110	72,593	72,834
Totals	22,308	1,027,195	9,004	27,206	72,659	
					Total Area	1,158,371
Forest to NonForest		53,722				
NonForest to Forest		33,843				
B. 2002-2009		2,002				
2,009	**Cropland**	**Forest**	**Settlement**	**Woodland**	**Water**	**Totals**
Cropland	4,151	26,222	2,544	2,544	12	35,473
Forest	15,824	901,256	9,317	31,009	14	957,420
Settlement	213	958	350	350	0	1,872
Woodland	2,546	72,754	5,878	5,878	45	87,100
Water	35	21	75	110	146,637	146,879
Totals	22,769	1,001,211	18,165	39,891	146,708	
					Total Area	1,228,744
Forest to NonForest		99,933				
NonForest to Forest		56,150				
C. 2009-2010		2,009				
2,010	**Cropland**	**Forest**	**Settlement**	**Woodland**	**Water**	**Totals**
Cropland	4,151	7,867	2,544	2,544	12	17,118
Forest	16,299	899,670	3,727	8,062	14	927,772
Settlement	213	1,197	350	350	0	2,111
Woodland	2,546	29,101	5,878	5,878	45	43,448
Water	35	21	75	110	146,637	146,879
Totals	23,244	937,857	12,574	16,945	146,708	
					Total Area	1,137,328
Forest to NonForest		38,165				
NonForest to Forest		28,088				
D. Overall		1,999				
2,010	Cropland	Forest	Settlement	Woodland	Water	Totals
Cropland	4,151	39,146	2,544	2,544	12	80,051
Forest	47,485	844,489	13,201	57,394	14	871,252
Settlement	213	3,113	350	350	0	10,492
Woodland	2,546	149,562	5,878	5,878	45	159,854
Water	35	21	75	110	71,345	71,586
Totals	52,207	970,395	9,711	89,505	71,416	
					Total Area	1,193,234
Forest to NonForest		191,821				
NonForest to Forest		118,081				

Carbon stocks for forest strata were based on the new allometric models described in G.1.4, Carbon Stocks within the Project Area, to determine C from diameter at breast height and by forest inventories to measure density of trees with different diameters.

G2.3.3 Baseline Net Annual Increments Due to Natural Regeneration Rates

Table 9 Annual carbon increments of major forest strata in Isangi REDD Project Area.

Stratum	Proportion of Total Area (%)	Area (ha)	No. of Plots	Species	Min DBH (cm)	tCO_2e incr	SE
Wet Forest	13.1	34,893	78	All	5	-22,806	3,675
Upland Forest	75.3	200,572	230	All	5	-128,523	36,030
Woodland	0.83	1,986	5	All	5	392	97
Total	**89.23**	**237,452**	**313**			**-150,937**	

G2.3.4 Emission Factors for Different Land Use Transitions

Table 10 Emission factors for land use class transitions that generate emissions.

From	To	CO_2e t/ha	Uncertainty
Forest	Cropland	855	6%
Forest	Woodland	749	21%
Forest	Settlement	855	8%
Woodland	Cropland	49	31%
Woodland	Settlement	73	31%

G2.3.5 Calculation of future deforestation and degradation rates.

Deforestation rates calculated from the net transitions from forest to non-forest from 1999 to 2002 (Year 3), 2002 to 2009 (Year 10), and 2009 to 2010 (Year 11) divided by the number of years in each interval. Conservatively, the average annual deforestation rate over the interval was assigned to the last year of the interval. Logistic regression was performed on the three estimates of deforestation vs. time. Logistic regression estimates a change in the ratio Y = (d/(1-d)), where d is the proportion of forest lost per year, and a linear function of time *t*: $Y = B_0 + B_1 t$ where B_i are estimated coefficients.

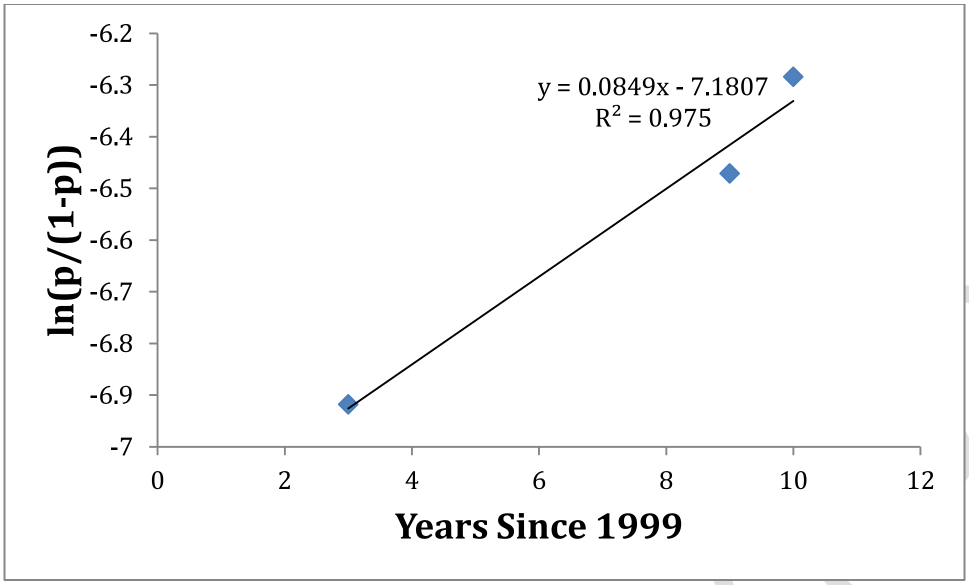

Figure 11 Logistic regression of proportion of project forest cover deforested (p) vs Year recorded for the Isangi initial reference region over three periods from 1999-2010. Regression equation with standard errors: Y = -7.1807 (+ 0.21 SE) + 0.0849 (+ 0.007 SE) x Year.

Following guidelines from the methodology VM0006, we chose the lower 95% confidence interval for the slope (0.0249 – 1.96*0.0007 = 0.0235)□as the parameter used for b in the prediction of future deforestation rates. The regression estimates B_0 and B_1 allow prediction of future non-forest area increasing with Year since 1999 as

$$NFA = \exp(-1.796 + 0.024Y) / [1 + \exp(-1.796 + 0.024Y)] \quad (3)$$

This equation yields the projected baseline deforestation rates over the project lifetime shown in Figure 12.

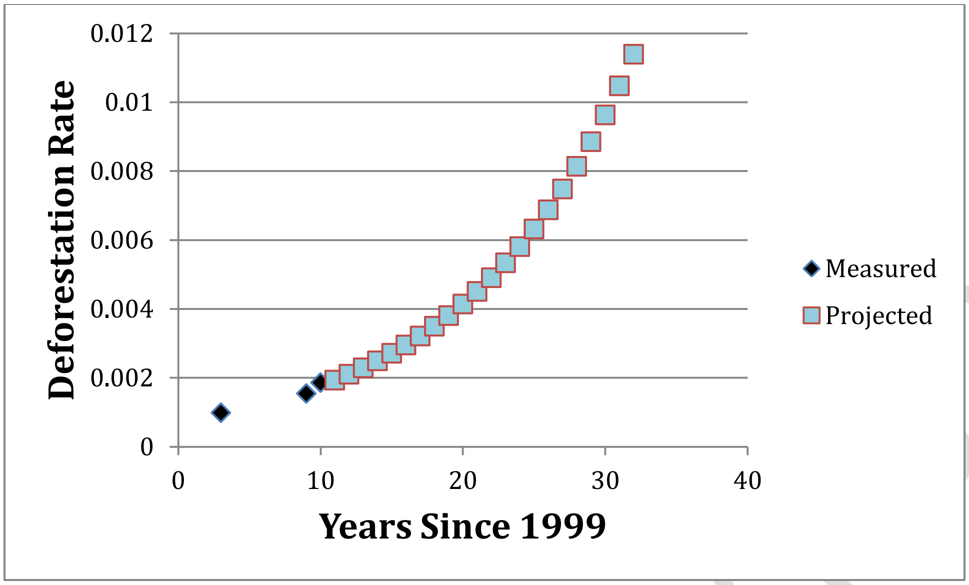

Figure 12 **Projected baseline deforestation, as proportion non-forested area, over the Isangi Project lifetime (blue curve) based on logistic regression (see Figure 8). Measured transitions are shown from 1999-2010 (brown squares). Project start date is March 2010 and extends 21 years.**

We validated the logistic regression model by evaluating the likelihood that a forest-occupied raster pixel from a land use cover map in 2005 would be converted to non-forest in 2010. We used images derived from the Change Detection Tool in ERDAS Imagine to identify permanent conversion of forest to cropland (Figures 10 and 11).

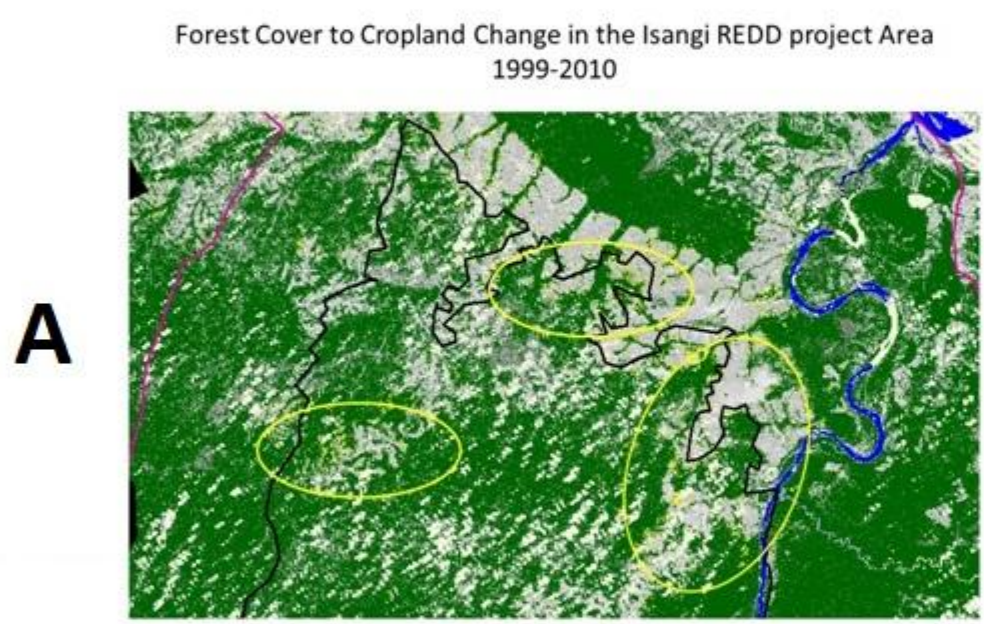

Figure 13 Evidence (yellow pixels) and location of deforestation in the northern (A) and southern (B) project area (black outline) and leakage belt (purple outline) from 1999-2010. Areas with yellow circles are those with the highest deforestation rates. White regions were cloud-covered in either 1999 or 2010.

An analysis of the spatial drivers affecting land use change in the initial reference region was performed for the transition of upland forest to cropland. Wet forests are deforested at a somewhat lower rate in this landscape because upland forest offers superior ease of clearing and preparation for farming. However, we were unable to accurately distinguish wet from upland forest from available satellite images consistently across years, due to differences in time of day and cloudiness among different images. Therefore, we merged these two forest types into a single forest class. Woodland is a much smaller fraction of the total land cover than forest, and is converted to cropland at nearly the same rate as cropland is converted to woodland across the initial reference region, and thus exhibits no net transition. Cropland and settlements exhibit net increases only, almost entirely at the expense of forest.

<u>Predicting Future Deforestation</u>
Analysis of the current upward trend in deforestation rate (Figure 12) suggests that the project area would eventually be deforested in the absence of the project (Figures 14 and 15). The analysis yields a logistic model that calculates deforestation probability on the basis of distance of a location from key landscape features (roads, rivers, villages, and forest edge).

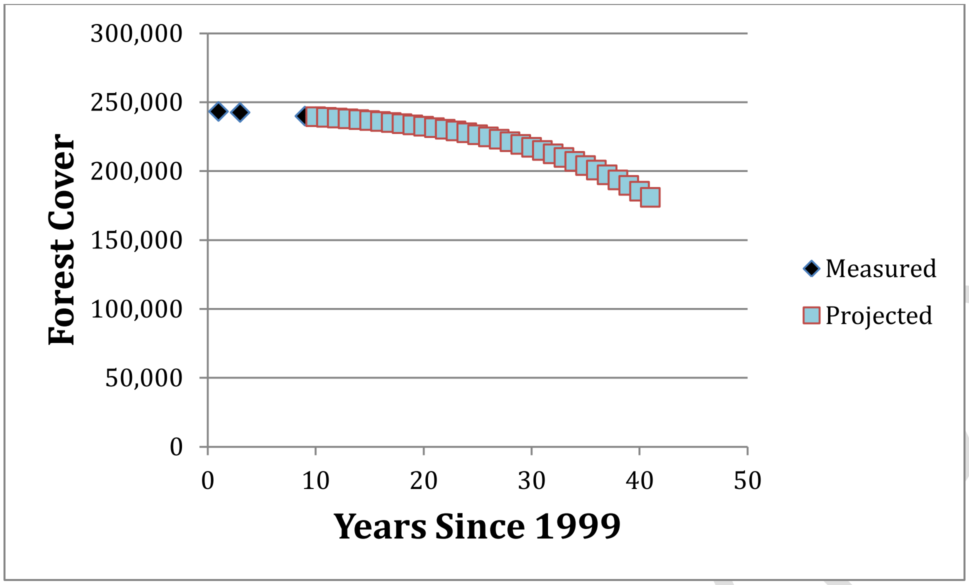

Figure 14 Measured (black diamonds) and projected (blue squares) forest cover in the project area over the project crediting period.

The change in land use classification of 10,000 pixels was analyzed from 1999 to 2010 transition. Two-thirds of the data were employed in a calibration of a logistic regression model of forest transition (proportion) to either cropland or settlements (grouped). This analysis was derived from the use of the Euclidean Distance tool in ArcGIS 10, whereby the occurrence of deforestation events (0 or 1) (Raster data from detection of change from 1999-2010 in classified Landsat Images, Figure 13) was recorded relative to distances to digitized features, such as navigable rivers, roads, settlements, and forest edge. This analysis yielded the following model, from 2/3 of the data from the historical reference area (south of the Congo River). Coefficients are shown with standard errors.

$$Y = -6.33 - 0.33 * (\pm 0.13) * \ln(\text{DISTROAD}) - 0.41 * (\pm 0.16) * \ln(\text{DISTRIVER}) - 0.83 * (\pm 0.38) * \ln(\text{DISTEDGE}) - 0.21 * (\pm 0.10) * \ln(\text{DISTSETT}) \quad (4)$$

This regression had an adjusted R^2 = 0.28, and all coefficients of variables included in the model were significant. The regression also minimized the Akaike Information Criterion (AIC) relative to other potential models with different combinations of variables. Since Y is the log ratio $\ln(p_B/(1-p_B))$, where p_B is the estimated baseline probability of a pixel of upland forest becoming cropland, Y is a normally distributed increasing function of p.

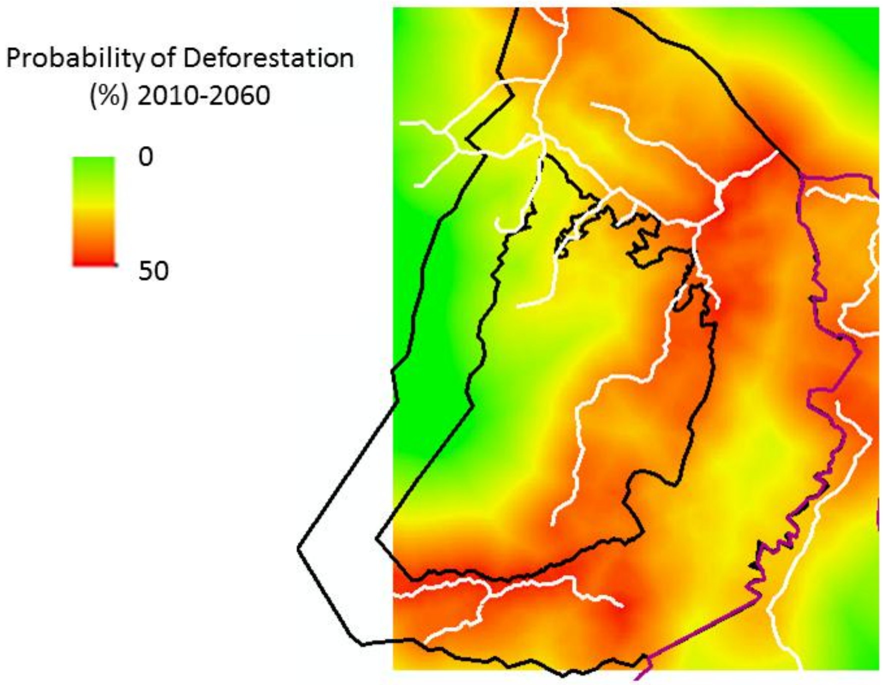

Figure 15 Modeled probability of deforestation in the Isangi REDD project and leakage area, as determined by the logistic regression model (Equation (4)). Forested areas colored red have a 25-50% probability of being deforested in the next 50 years.

This regression equation (4) was used to estimate cumulative probability of deforestation over the years 2010-2060, by summing the distances to each feature, with each distance weighted according to the coefficients in equation (4) using the Arc2010 GIS spatial analyst tool “Weighted Sum”. This analysis yields a diagram of likelihood of deforestation in the project and leakage area over the period 2010-2060 (Figure 5). The model clearly shows that, based on considerable proximity to forest edge, roads, rivers, and villages within the project area, more than half the project area is expected to experience 25-50% deforestation over the next 50 years under baseline conditions.

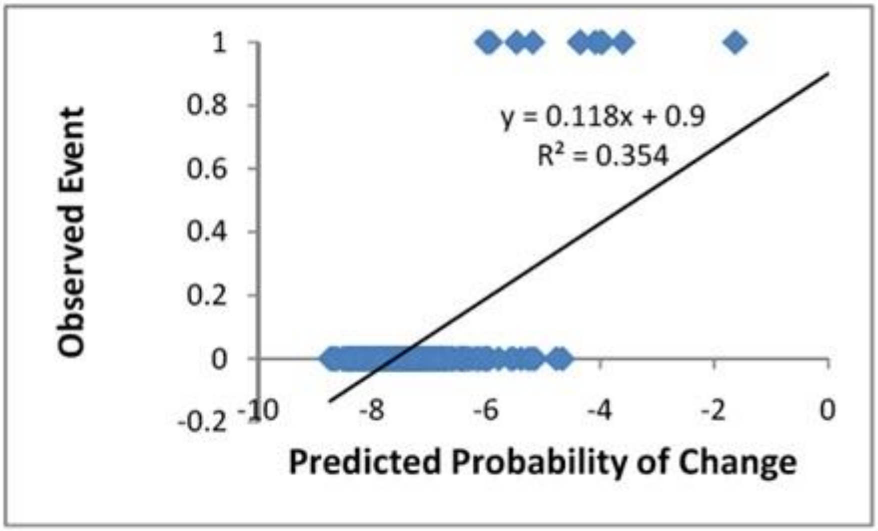

Figure 16 **Logistic regression of observed land use transition of pixels in the validation data set against predicted Y from the calibration regression (N = 3333, P < 0.0001).**

The regression was validated by regression of observed transition of upland forest pixels to cropland in the validation dataset (N = 3333) versus predicted Y for validation pixels based on their distances from landscape features (Figure 16). The validation regression in Figure 16 has nearly as high an R^2 as possible because of the relative rarity of conversion of upland forest to cropland (3.2 % over 11 years). Consequently, the calibration logistic regression model in Equation (4) was considered validated and used to project deforestation rates in the project area.

Table 11 **Estimated transitions in land use and land cover (hectares) in the project area over the Isangi Project lifetime.**

Year	Transition (ha /yr) [1]							
	WFCR	UFCR	WOCR	WFW	UFWO	CRWO	CRUF	WOUF
1	0	511	33	0	59	33	63	10
2	0	556	35	0	64	36	68	11
3	0	605	38	0	69	39	73	12
4	0	659	41	0	74	42	79	13
5	0	717	45	0	80	45	85	14
6	0	780	48	0	86	49	92	15
7	0	849	52	0	93	53	99	17
8	0	924	56	0	100	57	107	18
9	0	1,006	60	0	108	61	116	19
10	0	1,094	65	0	117	66	125	21
11	0	1,191	70	0	126	72	135	22
12	0	1,296	76	0	136	77	145	24
13	0	1,410	82	0	147	83	157	26

Year	Transition (ha /yr) [1]							
	WFCR	UFCR	WOCR	WFW	UFWO	CRWO	CRUF	WOUF
14	0	1,534	88	0	158	90	169	28
15	0	1,669	95	0	171	97	183	30
16	0	1,816	103	0	184	105	197	33
17	0	1,976	111	0	199	113	213	35
18	0	2,149	120	0	214	122	229	38
19	0	2,338	129	0	231	131	247	41
20	0	2,543	139	0	249	142	267	44
21	0	2,765	150	0	269	153	288	48

WFCR = wet forest to cropland
UFCR = upland forest to cropland
WOCR = woodland to cropland
WFWO = wet forest to woodland
UFWO = upland forest to woodland
CRWO = cropland to woodland
CRUF = cropland to upland forest
WOUF = woodland to upland forest
Note: cropland or woodland to wet forest never occurred and were eliminated for simplicity

Forest scarcity corrections (Mather and Needle 1998) are not relevant for the current crediting period of the Isangi project because less than 10% of the initial reference region has been deforested, and the projected cumulative deforestation over the project life is 11.8%. This amount would leave more than 80% of forest remaining, far above the forest scarcity threshold where deforestation rates tend to decline because there is little forest remaining to cut (Mather and Needle 1998).

G2.3.6 Emissions from Degradation in the Baseline Scenario

Commercial logging by a single concern (Safbois, Ltd) represents a significant emission source mostly because of the 90,000 liters of diesel fuel required to ship a barge of logs from the concession to Kinshasa, the number of barges shipped, the volume of wood harvested, and the volume of wood destroyed to make logging trails and roads. Planned future selective logging is to harvest two commercially viable tree species from 4,000 hectares each year in a 30-year rotation within the concession. Estimates of damage to existing forest from skid trails and the formation of logging roads and tracks, plus the export and transportation of harvested wood have been estimated by Safbois to be a loss of 6.1 tons C per hectares. The emission factor for selective logging in the baseline scenario in the project area is therefore 4,000 hectares x 6.1 t C/hectare x 44/12 = 89,467 tons CO_2e.

Table 12 Projected emissions under baseline conditions.

Year	Net Deforestation Project Area Baseline (ha)	Net Emissions Deforestation Baseline (tCO_2e)	Logging Emissions t (CO_2e)	Total Baseline Emissions (tCO_2e)
1	511	419,132	89,600	508,732
2	556	456,185	89,600	545,785
3	605	496,506	89,600	586,106
4	659	540,381	89,600	629,981
5	717	588,122	89,600	677,722
6	780	640,067	89,600	729,667
7	849	696,584	89,600	786,184
8	924	758,072	89,600	847,672
9	1,006	824,965	89,600	914,565
10	1,094	897,734	89,600	987,334
11	1,191	976,890	89,600	1,066,490
12	1,296	1,062,988	89,600	1,152,588
13	1,410	1,156,631	89,600	1,246,231
14	1,534	1,258,470	89,600	1,348,070
15	1,669	1,369,213	89,600	1,458,813
16	1,816	1,489,629	89,600	1,579,229
17	1,976	1,620,548	89,600	1,710,148
18	2,149	1,762,871	89,600	1,852,471
19	2,338	1,917,571	89,600	2,007,171
20	2,543	2,085,703	89,600	2,175,303
21	2,765	2,268,408	89,600	2,358,008

G2.4 Community Impacts in Baseline Scenario

Continued reliance on conversion of primary forest to cropland leads to large-scale degradation of soils in cleared areas. Farming reduces mineral nutrients, which are only present from the ash of burned forest. Heavy rains and burning of crop residues remove nutrients from the system, resulting in an exceedingly phosphorus-poor soil within 2-3 years that forces abandonment of the land for 10-15 years, after which a second harvest and crop production cycle follows. After the second cycle, soils are often too poor to support regeneration of primary forest species without assistance. This soil degradation forces further conversion of primary forest and an expansion of degraded lands. In areas, such as the Isangi Project area, where human population densities are high and growing, expansion of subsistence agriculture will likely lead to local flooding, increased silting of rivers used for fishing, and damage to the few available roads and thus commerce transportation routes, among other consequences.

G2.5 Biodiversity Impacts in Baseline Scenario

As is discussed in a subsequent section, the lack of permanent farmland, low fertility soils and the threat of livestock disease outbreaks leads to high hunting pressure on forest fauna for protein. Dozens of large vertebrate species, including ungulates, primates, birds and herpetofauna are hunted, and comprise a significant portion of the diet of most families living in the project area. Without the project and its efforts to develop alternative protein sources, bush meat hunting would likely have significant negative effects on biodiversity in the project area and surrounding region.

Although current deforestation rates are not high enough to isolate forest patches or even come close to eliminating primary forest habitat, our projected baseline deforestation rates will approach 1% within 15 years, a rate associated with rapid deforestation, habitat loss, and habitat isolation in Indonesia. Such consequences might greatly accelerate the negative impact of bush meat hunting already evident under low deforestation rates.

G3 Project Design and Goals

G3.1 Major Climate, Community, and Biodiversity Objectives

Jadora seeks to address the issue of deforestation in the RDC on a local level, protecting the climate and biodiversity by maintaining and enhancing this tract of rainforest in the Isangi territory. The project will protect a threatened but biologically diverse forest with thousands of rare and declining species of vertebrates, invertebrates, and plants. It will also improve the livelihoods of people living near and within the forest, and it represents a promising opportunity that could lead to forest conservation projects at other logging concessions within the République Démocratique du Congo. The climate objective is to reduce emissions from deforestation and forest degradation during the project lifetime. The community objective is to the provide jobs, education and access to healthcare. The biodiversity objective is to protect key species of concern and their habitat.

G3.2 Major Project Activities

Project activities to be implemented fall under the categories of agriculture, fuel use, forest monitoring, education, health care, and community outreach. Three categories of teams comprised of locally sourced and trained employees manage the project and project activities. One set of teams will monitor carbon stocks and conduct afforestation and reforestation activities. The second team will assess, protect, and restore wildlife resources; patrol the forest; ensure compliance with community agreements; and educate the local community about the program. The third team will work with the local people, government, and NGOs to improve livelihoods with sustainable development initiatives.

Jadora has on-the-ground experience in developing experimental farms, distributing educational materials, and basic construction. The Jadora team has comprehensive experience in implementing programs from the inception stage through materials acquisition, materials transport and distribution and construction.

Through the Community Consultation Team Jadora has assessed the needs and desires of each village within the project area. Every village in the project area has the need for basic materials for education, complete school (re) construction, and agricultural outreach for improving crop yields and soil fertility and developing alternative protein sources. This is true across all of the RDC.

The project activities outlined in this section will address the education, agriculture and fuel source needs of the villages with the express goal of using the program to improve the lives of locals and reduce their dependence on cutting primary forest.

Agriculture

Our objectives in agriculture are to:

- Help local people sustain soil fertility of croplands longer to reduce the necessity to clear forest, and
- Develop alternative protein sources to reduce the pressure to hunt animals in the forest. Experts in agriculture will be hired to train our local teams and supplement educational endeavors in the community centers.

Extended soil fertility: A key effort is to extend the lifetime of a cleared plot by a factor of two or more to slow down the rate of deforestation. Demonstration gardens are being planted to illustrate the diversity of available crops, their productivity, and land management techniques required to grow them on previously exploited lands.

Jadora will demonstrate at the experimental farms

- Seeds for desired crop varieties that can thrive in tropical environments.
- How to return crop residues to the soil (rather than burning) that will extend its fertility by increasing available nutrients.
- Crop rotation of legumes to increase and maintain available soil nitrogen
- Educate villagers on how to use livestock dung as sustainable fertilizer by raising goats and chickens near farm areas so collection and usage is simple.

A key objective is to demonstrate and encourage farmers to build mutually supporting systems of crop and protein production that do not rely on forest destruction or degradation.

Protein sources: We plan to encourage the development of small-scale aquaculture systems as an alternative to bush meat hunting. Demonstration tilapia farms will be constructed will be constructed for educational purposes and to supply stocking fish for other farms (approximately ten per village). We will provide engineering advice so that ponds can be built with local labor and maintained by entrepreneur fish farmers, possibly funded through a local micro-finance for REDD project participants. We will also show how crop residues can be fed to existing livestock, thereby reducing the need for livestock to use regenerating forest in abandoned agriculture plots.

Increasing efficiency of fuel use:
Jadora's on-the-ground teams will assist in the distribution of fuel-efficient stoves that burn less wood or charcoal, thus reducing rates of deforestation and the release of CO_2. Additionally, they are also a means to assist the women of the local communities. Fuel collection primarily falls to the women within the household and community and the less fuel used, the less that has to be collected or purchased. This increases time available to spend taking care of children and working on other activities and stretches available financial resources.

Plantations for fuel wood:
Areas will be planted with native forest species from local seed sources. At intervals determined by the crop species, villagers can harvest the trees use for fuel stock. The tree species will be chosen so as to create a semi natural forest system for the duration the plantation exists before harvesting while maximizing growth rates and fuel production.

Forest monitoring:
The forest is monitored using remote sensing, a grid of forest carbon plots measuring the carbon content of the forest (Figure 4), and a suite of monitoring strategies to track farming activity and charcoal production within the reference area, the leakage buffer, and the concession itself. While models of carbon savings will be created to project the impacts, empirical evidence from the concession and similar control areas outside of the project will be used at verification to confirm the carbon savings generated.

To ensure a conservative estimate of sequestered carbon, forest teams are monitoring above ground woody biomass (living and lying dead wood) in the forest plots. Teams of local foresters have been trained to conduct the monitoring, with oversight from the project management team as necessary to achieve the precision required by best practices. One team per 2-4 villages will monitor where farming is occurring and work with the villages to find alternatives to clearing primary forest. Such teams will be highly integrated into the project's social capacity work. Monitoring teams will also be on the ground to evaluate and document biodiversity.

Education:
The project will supply materials such as pens, booklets, chalk, books and maps to schools and directly to local schoolchildren. Other materials such as chalkboards, seats and desks will be provided to the schools themselves. We plan to provide brick molds and support the costs of labor and supplies for building new schools. Finally, we plan to invest community capacity-building funds to pay teachers and reduce school fee burdens on parents.

Health care:
The project will implement a number of activities relating to health care, including repairing health care clinics, supplying medicine for major diseases such as malaria, cholera, dysentery, yellow fever and other intestinal diseases, and sponsoring monthly or bi-monthly visits by doctors to local villages, and support for family planning

programs. Jadora has partnered with the Emerging Pathogens Institute at the University of Florida, which has extensive field healthcare experience in funding, training, and conducting these activities.

Community outreach:
A primary community center will be opened in a central location within the project area, followed by individual centers in strategic villages throughout the project area. These centers will become the locations for education, outreach, and community meetings. Additionally, items at each center can be made available for community use, such as sewing machines, bicycle repair equipment, etc, to anyone within the community.

Capacity building:
To encourage entrepreneurial efforts to use new agricultural and aqua-cultural methods, we are studying the feasibility of implementing a pilot micro-finance project that would provide funds to allow villagers to invest in the infrastructure (ponds, corrals, irrigation systems, etc.) in return for participating in a program to avoid cutting the forest.

G3.3 Location of Project Activities

The project activities will take place within the two Safbois concessions and will extend to villages in the leakage belt when appropriate. We plan to concentrate effort in the leakage belt directly to the south and northeast of the project area, as current deforestation rates are highest there. The project activities will focus on the 100,000 - 150,000 people living in the project area.

G3.4 Time Frame and Project Accounting

The project start date is March 1st, 2010. The historical reference period extended from January 1999 to November 2010.

The project crediting period will be March 1st, 2010 – February 28th, 2040. Baseline validation period will be March 1st, 2010 – February 28th, 2015. Verification will be sought in 2012 and 2015. We expect to re-validate the baseline in 2015, 2020, 2025, 2030, and 2035 in anticipation of accelerating deforestation in the reference region.

G3.5 Project Risks and Mitigation Measures

Major risks to the Isangi project relate to political and/or social instability and rising land opportunity. Management has identified the following risks and mitigation measures:

Political Instability
Over the last 50 years the RDC has been one of the least politically stable countries in the world. However, the first free elections under a new constitution were held in 2006, in which the current president Joseph Kabila was elected with 58% of the vote. There has been relative political stability since those elections, and the next elections occur in November 2011. Jadora's partnership with Safbois will be crucial in navigating the political instability in the RDC throughout the course of the project. Jadora is also seeking the highest level of cooperation and agreement with the government agencies

of the RDC. These agreements should be recognized independently of the status of politicians in power. By cooperating with outside groups such as the World Bank and UNDP, Jadora intends to be recognized as a viable entity with internationally binding agreements in place regardless of the administration.

Social Instability

The UNDP's Human Development Index ranks the RDC 168 out of 169 countries. Military and social unrest are at critical levels, particularly in eastern RDC as regional troubles have crossed the border. Jadora recognizes this risk, and alleviation of critical social ills is one of the primary goals of the Isangi project. The integrated program has a focus on social capacity building. By focusing on education, healthcare, and economic well being, Jadora intends to improve the social stability of the region and will meet regularly with local chiefs of the project region to ensure open discussion that will help ward off social uprising in certain circumstances.

Land Tenure

Risk related to land tenure does exist; however, the entire area encompassed by this project is covered under a pre-existing logging concession awarded to Safbois by the government of the RDC (Isangi Logging Concessions No. 091 and No. 034). There is no current dispute over the status of the land.

Rising Land Opportunity Costs

A significant rise in world timber prices could lead to additional deforestation pressures. The threat of mineral resources discovery in the area is also of concern, as new sources of valuable resources would further add to development pressure in the project area. The operating agreements between Jadora and Safbois ensure that any project partner deemed to have broken the terms of the agreement and negatively impacting REDD initiatives will bear financial responsibility for its actions. Additionally, Jadora prioritizes transparency and cooperation with the Congolese government and internationally organizations such as the World Bank and UNDP, making it difficult for project participants to undermine their agreements without receiving significant pressure from many sides.

Natural Disturbances

The primary risk in the project area is from flooding and/or drought. Both occur naturally throughout the project area and life in the region has adapted to the natural cycles of flooding and drought. These disturbances will not cause long-term problems in the overall design and execution of the project, and all Jadora employees will be provided with adequate means of protection in the event of a large scale flooding or drought. Other aspects of extreme weather and geological activity have been deemed not to present serious risk to the project.

G3.6 Maintenance of High Conservation Values

Analysis indicates that the Isangi REDD Project area is an HCV Forest both biologically and for the local communities (Section G1.8 and CM1.2). In order to maintain the HCV Forest, Jadora is instituting programs that will keep the 241,000 hectares of primary forest intact for watershed protection and traditional and cultural use. This maintenance requires the reduction of deforestation from farming. It also requires an increase in natural animal populations, accomplished through the reduction of hunting pressure as a result of increasing produced protein sources (see section G3.2).

In line with the precautionary principle, the Congo River basin area has been inadequately scientifically studied across the region. Although there is a lack of complete and systematic information on taxonomic diversity, this does not mean the Jadora Isangi REDD+ project should not proceed in this area. Working to reduce deforestation and hunting pressures in this area should be undertaken well before its diversity can be fully documented. Without the implementation of these crucial project activities, an unknown number of species could disappear before they are known to science.

G3.7 Measures to Enhance Climate, Community, and Biodiversity

Introducing new agricultural techniques to increase yield and protein availability will have benefits beyond the project lifetime. Once understood and implemented, the usage of these techniques and practices do not have a finite lifetime. Jadora has plans in place for a microfinance program whereby the local people will have access to funds to further their activities in agriculture and aquaculture, as well as the possible production and sale of fuel-efficient stoves, beyond the project lifetime. Funds from carbon revenues are anticipated for this program after the project’s first verification.

G3.8 Involvement of Stakeholders

Before developing the PDD, Jadora first identified the general project area and the communities that could potentially be impacted by the project. We then set up a Community Consultation Team (CCT) to serve as an educational ambassador for the project. The team has visited the 33 identified major and minor villages in and around the project area and continues to interact with village leaders in order to ensure cooperation and understanding between Jadora and the local populations. Even though the project area comprises 261,512 hectares of the 348,000 hectare concession, we believe it is important to engage communities outside of the project borders in order to educate locals and ensure no negative impacts result in the immediate vicinity of the project area.

<u>CCT Personnel</u>

Currently Noah Herland and Philemon Liombo head Jadora’s Community Consultation Team (CCT). When available Ethan Freid (Jadora Director of Field Operations) also works with the CCT.

Noah Herland worked in the program of the World Agroforestry Center: Agroforestry Trees Products for Africa (AFTP4A) on increasing the living standards of the population through agroforestry in the District of Tshopo in partnership with the IFA-Yangambi.

Before coming to work for Jadora, Nick was involved with peace and conflict resolution through Participatory Action Research in North Kivu Masisi. This project involved conflict management between farmers and pastoralists communities associated with Action for Solidarity Peace (ASP association) in conjunction with the Life & Peace Institute (LPI-RDC).

Philemon Liombo has a Bachelor of Science in Education Administration and Planning with option of Education from the University of Kisangani's Faculty of Psychology and Educational Sciences. He has experience working as a professor of psychology and pedagogy at the Institute Boboto in Kisangani. He has also done social development with the UNOPS / KISANGANI (Ubundu territory).

Additional information is available in the Appendix of this document.

G3.9 Publication of Public Comment Period

The Jadora-Isangi CCBA PD will be posted to the CCBA website (http://www.climate-standards.org) and held open for public comment. A French version of the CCBA PD was distributed to the local communities within the project area.

Jadora employees are holding general community meetings to explain the project with each village potentially impacted by the project. At each meeting the project is fully explained and discussed.

To announce the community meetings fliers were posted at:

- Houses of village chiefs
- Local schools
- Churches
- Local radio

At each meeting a condensed version of the Jadora-Isangi CCB PDD, in French, is provided to the community. The villagers are informed that the full document is on the CCBA website and available for public comment. Because internet is unavailable throughout the project area, the villagers are informed that they may come to the Jadora base camp to access the internet and documents and translators may assist them in uploading their comments. The generator providing electricity for the VSAT internet system is available from 17:00 to 21:00 daily.

G3.10 Tools for Conflict Resolution

Isangi maintains a complex web of both traditional and territorial authorities. Jadora's carefully cultivated relations with local, regional, and national authorities have helped Jadora understand how local conflicts are resolved. Jadora has been judicious to comply with the local rules and customs in designing its processes for conflict resolution. To reduce the occurrence of conflicts, Jadora is proactive about the equitable distribution of opportunities and benefits from the project. The grievance process involves building systems for early conflict detection into the larger project design and educating Jadora employees on conflict mediation. When possible, Jadora aims to resolve conflicts promptly and at the local level.

Additional information is available in the Appendix of this document.

G3.11 Project Financial Support

Jadora is committed to covering the operating costs of the project, including those for implementation, project activities, and CCB benefits until credits are issued and carbon revenues are realized. Jadora is also currently investigating additional potential sources of funding. Despite private support from Jadora and Safbois, the project would not be possible without revenues from the sales of carbon credits. Management's estimates of net carbon revenues from the project are sufficient to cover the estimated costs related to project activities, biodiversity, social capacity building and carbon monitoring. Estimates of project development costs are based on extensive experience in the field in the Isangi territory. A detailed financial plan has been provided to the validators.

G4 Management Capacity and Best Practices

G4.1 Project Proponents

<u>Project Proponent</u>
Jadora LLC (Jadora) is a sustainable land and natural resource management company. Jadora's role will be that of overall project design, development and execution. Jadora has all carbon rights contained within the project boundary and is ultimately responsible for carrying out all project activities.

Contact (USA): Donald Tuttle, Founder & CEO
Address: 6401 Lake Washington Blvd Unit 208
Kirkland, WA 98033
Telephone: +1 425 614-6191
Email: don@jadorallc.com
Website: www.jadorallc.com

Key Individuals and roles:

- Ethan Freid, PhD, Director of Field Operations (directs operations of all teams and programs, including oversight of forestry data collection)
- Joe Wasilewski, Director of Biodiversity (directs and runs the faunal biodiversity program)
- Duncan Earle, PhD, Director of Social Development (directs and runs the CCT and social capacity programs)
- Mark Ritchie, PhD, Technical Director (oversees all technical aspects of the project, including land use analysis, carbon accounting, and GIS needs)
- Noah Herland, Agro-Economist / Director of Social Development and Community Consultation Teams (runs the CCT and agriculture programs)
- Philemon Epaka Liombo, Community Consultation Team Manager (works for the CCT and village development program)
- Jacque Likakambula, Forest Carbon Assessment Manager (co-manages the

forestry teams)
- Emmanuel Alongoli, Forest Carbon Assessment Manager (co-manages the forestry teams)

<u>Other Entities Involved in the Project</u>

Safbois
Societe Africaine du Bois (Safbois) is a Congolese logging company that produces selectively logged, exotic hardwood timber and timber products. Safbois owns the timber rights to the project location and provides Jadora with in-country assistance for all aspects of the carbon project. This assistance includes access to facilities and equipment at the project site, transportation and other logistics inside the RDC. Safbois' affiliate in the United States is American Trading Company.

Contact (RDC): Daniel Blattner
President, Société Africaine du Bois
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Kingabwa, Limete, Kinshasa, RDC
Telephone: +243 81 500 8300 (RDC)
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Contact (USA): Brandon Blattner
Vice-President, American Trading Company
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Fax: +1 215 295-4488
Email: brandon.blattner@gmail.com
Website: www.amtradeco.com

Emerging Pathogens Institute (University of Florida)
The Emerging Pathogen Institute (EPI), located at the University of Florida in Gainesville, Florida, has more than 185 faculty and post-docs across 50 countries focusing on pathogens such as HIV, Malaria, Dengue, Rubella, and Cholera as well as breaking ground on forward-looking antiviral strategies such as evolution and molecular epidemiology of human and animal pathogens. EPI recently opened a new, state of the art USD $55 million research facility on the Gainesville, Florida campus and, since 2006 has received more than USD $90 million in grants funded by notables such as the Centers for Disease Control, National Institutes of Health, Department of Defense, Department of Agriculture, and the Bill and Melinda Gates Foundation. EPI will assist Jadora in its local healthcare initiatives to set up clinics for treatment as well as labs for research on infectious diseases and emerging pathogens in the project area and region.

Contact (USA): Marco Salemi, Ph.D.
Department of Pathology, Immunology and Laboratory Medicine
College of Medicine, University of Florida, Emerging Pathogens Institute
2055 Mowry Road
P.O. Box 103633
Gainesville, FL 32610-3633, U.S.A
Telephone: +1 352 870-9505 (USA)
Email: salemi@pathology.ufl.edu

Congo National Herbarium
The Congolese National Herbarium is partnering with Jadora to work on the flora of the project area. They will assist in plant identification and training on specimen collections. Jadora will assist the Herbarium with access to the project area and training for carbon data collection.

Contact (RDC): Elasi Ramazani Kitima (Botaniste)
B.P.:2015
Kisangani
Téléphone: +243 99 37 20 148 (RDC)

IFA-Yangambi- l' Institute Facultaire des Sciences Agronomies de Yangambi
IFA is partnering with Jadora to work on agriculture, biology, and social capacity development research. IFA will provide Congolese researchers to study in the project area and will also grant Jadora access to Yangambi's agricultural facilities. Jadora will assist IFA in access to the project area and on-the-ground support for its research.

Contact (RDC): Prof. Ferdinand Kombele Bishosha
Recteur de l'IFA/Yangambi

G4.2 Technical and Management Expertise

The Jadora management team has extensive experience in community engagement, biodiversity assessment and carbon measurement across Africa, Asia, Latin America and the Caribbean. The Isangi project management team includes two field managers (Ethan Freid and Joe Wasilewski) who have experience with ecological projects and biodiversity assessments and a technical manager (Mark Ritchie) who has experience with carbon measurement and monitoring. A large part of the project management team consists of local Congolese individuals, including a senior agro-economist (Noah Herland) who has experience in agroforestry and conflict resolution, a specialist in socioeconomic capacity building (Duncan Earle in conjunction with Philemon Liombo), and two forest team managers (Jacque Likakambula and Emmanuel Alongoli) with experience in forest management and monitoring.

Jadora has partnered with other organizations to fill management and technical expertise in the project's development. MDA Federal has provided GIS and land analysis services for the Isangi project in the past; however, Jadora and Safbois believe they are now able to draw on internal resources for these services. For assistance in its public health initiatives, Jadora is partnering with the Emerging Pathogens Department at the University of Florida. For sales and brokerage services, Jadora has partnered with Global Climate Futures AB, which has extensive experience in emissions trading and carbon businesses.

Safbois has decades of on-the-ground management and operational experience in the République Démocratique du Congo. Safbois manages in-country logistics for the project and plays a key role in recruitment activities to fill employment gaps in the RDC.

Jadora Management Team

Ethan H. Freid Ph.D: Botanist/Director of Field Operations
Ethan has two years experience working in the RDC training carbon assessment teams and directing field projects involving bridge reconstruction, educational material dispersal, and construction of fishponds.

Ethan is a botanist specializing in terrestrial ecology and plant taxonomy of the angiosperms. He grew up in California, graduating from Humboldt State University in 1992 with a Bachelors of Science degree in Botany. He attended graduate school at Miami University (Ohio) graduating with a Ph.D. in Botany in 2000. Ethan has worked and traveled throughout the Caribbean, Central and South America as well as Central and Southern Africa on vegetation and ecological projects. He has conducted and run field projects and expeditions ranging from small-scale two person teams to large multidisciplinary marine and terrestrial rapid assessments.

After graduate school he taught at the College of the Bahamas (2 years) and at the University of Tampa (7 years) and is now working full time for Jadora LLC. Ethan is also currently on the Science Advisory Committee of the Bahamas National Trust and the Board of Directors of the Bahamas Environment Fund.

Ethan has published 7 papers and 25 technical reports on projects in the Bahamas and the Caribbean. He has worked as a consultant for the Bahamas National Trust, Coastal Systems International, Applied Technology Management, SEV Consulting, Islands by Design, and Wilson Miller.

Joe Wasilewski: Director of Biodiversity
Joe has two years experience assessing faunal biodiversity in the RDC and Isangi in particular. He has trained and directed multiple field teams in rapid assessment protocols.

Joe is a renowned wildlife biologist specializing in the natural history of large reptiles within wetlands of southern Florida, the Caribbean and Tropical Latin America. His 1981 undergraduate Biology degree from Florida International University served to open up many professional doors associated with his life-long love of tropical wildlife.

He is an active member of the International Union for the Conservation of Nature serving in both the Iguana Specialist Group as well as the Crocodile Specialist Group. He serves as the resident wildlife biologist for Florida Power & Light at their Turkey Point nuclear power plant. He consults in the field on critically endangered species for governments and NGOs.

Recent projects include developing and constructing nesting habitat for American crocodiles, a project he completed in December 2007 resulting in successful crocodile nesting in 2008. Joe works extensively through the Caribbean with Rock iguanas, Central America (Costa Rica) with American crocodiles, and South America (Guyana) with Black Caiman. He is a frequent guest on television and has consulted and provided animals for Animal Planet, National Geographic, the Discovery Channel, the History Channel, and Florida Public Television, among others.

Duncan Earle, Ph.D: Director of Social Development

With a doctorate in development anthropology (1985 Albany), Dr. Earle's career has involved research, teaching and direct engagement with international development and indigenous cultures, beginning with setting up and helping to direct an NGO in Guatemala, another in Mexico, and consulting for numerous other projects and programs over a 30 year span.

He has taught development theory and practice at the undergraduate and graduate level (Clark, Vanderbilt, Texas A&M, American University) and researched alternative approaches to tropical region development, environmental protection, and eco-tourism, in Mexico, Guatemala, Nicaragua, Brazil, Bolivia, Ecuador and Southern Africa. He has also carried out research and administered development and environmental awareness programs in low-income peri-urban settlements (colonias) in the US-Mexico border region.

A Fulbright scholar, recipient of Rockefeller, Melon, HUD, EPA, and Ford Foundation grant support and former director of a University-based scholarly center, Dr. Earle has traveled to over 50 countries, and speaks fluent Spanish, as well as some Portuguese, Italian, French, and two indigenous languages. He is the author and/or co-author of over 40 articles and book chapters, one book, and numerous field reports. He has also been associate director and director of university-based centers, done research for the US Census, served as an advisor for development NGOs, and spoken about development alternatives to such institutions as the Organization of American States, USAID, and the Ford Foundation. He is an editor for the Library of Congress and a Fellow of the Society for Applied Anthropology.

Noah Herland: Agro-Economist/ Director Social Development and Community Consultation Teams

Nick grew up in Kisangani where he attended Sacred Heart Maele for high school, and then completed his University degree at the Institute of Agricultural Sciences, Yangambi (IFA- Yangambi). As part of his studies, he worked on the use of wild food plants and non-timber forest products by communities. Nick also did coursework in project cycle management, management focused on results, planning, monitoring, evaluation and learning. After university Nick worked in the program of the World Agroforestry Center: Agroforestry trees products for Africa (AFTP4A) on increasing the living standards of the population through agroforestry in the District of Tshopo in partnership with the IFA-Yangambi.

Before coming to work for Jadora, Nick was involved with peace and conflict resolution through Participatory Action Research in North Kivu Masisi. This project involved conflict management between farmers and pastoralists communities associated with Action for Solidarity Peace (ASP association) in conjunction with the Life & Peace Institute (LPI-RDC).

Philemon Epaka Liombo: Community Consultation Team
Philemon has a Bachelor of Science in Education Administration and Planning with option of Education from the University of Kisangani's Faculty of Psychology and Educational Sciences. He has experience working as a professor of psychology and pedagogy at the Institute Boboto in Kisangani, as well as constructing roads for TABET. He has also done social development with the UNOPS / KISANGANI (Ubundu territory).

Jacque Likakambula: Forest Carbon Assessment Manager
Jacque has a state diploma in chemistry and biology with 5 years professional experience with FRM (Forest Resource Management)

Currently he works for Jadora as a Forest manager, trainer and team leader. He has a detailed knowledge of the systematics of trees, as well as the use of GPS, compass, and clinometer.

Emmanuel Alongoli: Forest Carbon Assessment Manager

Emmanuel graduated from the state agricultural section. He has had three years of higher studies at the academic institutes of higher agronomic studies [ISEA].

He started his professional experience as a production assistant for the CHP (Companie Huile de Palme) from 1999 to 2002. From 2005 - 2009 he worked as a boussolier, clinometer pointer, and counter botanist in cell LAYOUT Kisangani [FRM].

G4.3 Capacity Building

Jadora prioritizes hiring and training staff from local communities to fill employment positions related to the project. Local people have been recruited and trained as forest evaluators, monitors and protectors with on-the-job conservation and development education. These jobs provide employment opportunities previously only available in the sustainable logging and palm oil industry. Our in-country teams have employed over 30 local Congolese who have gained extensive training and experience in techniques to assess carbon stocks as well as tree identification.

Jadora's training plan starts with working with our own team members. Initial and continual training has been done on forest carbon data collection, tree identification, faunal biodiversity assessment, new farming techniques, and fishpond construction and maintenance. Jadora's goal has been to train our own personnel so they can act as team leaders on project activities in various villages. We have developed our capacity to construct no-burn farms and tilapia fishponds. Additionally, Jadora has begun reconstruction efforts on small bridges to assist in local travel and commerce as well as in building trust with impacted communities. These activities took place in 2010 and 2011.

Training for Jadora Forest Carbon and Biodiversity Field Crews

Jadora has undertaken a policy that training is not something that is done once and not continued thereafter. After an initial training session in March 2010, follow up has been conducted with regular training sessions, in particular for tree identification. While forest carbon assessments have been conducted, the Jadora team leaders have continually trained their personnel on tree identification as new species are encountered.

Date	**Training Type**	**Documentation**
March 2010	Carbon Data Collection	Video
October 2010	Carbon Data Collection and training videos	Video
January 2011	Carbon Data Collection	Photos
July 2011	Carbon Data Collection and plant taxonomy	Photos
July 2011	Faunal Surveys	Photos

Additionally, Jadora hires local individuals to work on construction projects including bridge reconstruction, fishpond construction and management, and school construction. Individuals who work on these projects learn the skills necessary to do construction on their own as well as build and run their own fishponds.

Capacity Building in 2012 in relation to Project activities.

Jadora capacity building plans are to focus on construction of experimental farms (including agricultural outreach), fishponds, bridge reconstruction and an initial school project (see projected activities map) in Djabir.

CARBON ASSESSMENT: Jadora will resample 20% of all plots in any given year. In every area that Jadora does forest carbon assessment, locals are hired to assist in the assessment as well as make sure the teams are not working in sacred areas. These individuals learn how to do carbon assessments, use compasses, GPS units, clinometers, and identify trees. All of these skills can provide them the opportunity for employment in other forestry companies and projects.

FARMS: Jadora will construct experimental farms in three new locations (see project activities map). At each of these farms Jadora personnel will hire locals to be trained in abandoned field clearing and rehabilitation, no burn agricultural activities, new seed crop varieties and crop rotation. At each farm site an open-air classroom (pavilion style) will be constructed so that local farmers can come to the farm sites and learn the new techniques and see them in action. One day training sessions will occur every three months at each farm site. Local participation is voluntary.

PONDS: Jadora will construct fishponds in three new locations (see project activities map). At each of these locations Jadora personnel will hire locals to construct the new ponds. Through the construction process the villagers will learn about fishpond site selection, pond wall construction as well as the stocking and maintenance of the fish populations. Training will occur as ponds are constructed with additional training on pond and fish stock maintenance every four months.

SCHOOLS: Jadora will build an initial school in Djabir. The purpose of the initial school building is to assess equipment needs, material transportation, labor requirements and construction issues associated with school building.

BRIDGES: Jadora will focus on continued improvements to the Bongai River Bridges (See project activities map). Training on bridge "need assessments", material acquisition (soil, logs, etc) and transportation, and bridge reconstruction will be done on site. Every bridge is different in terms of the river, the width, and its requirements, so each one is a training exercise in itself.

G4.4 Community Employment Opportunities

The project is assessing already impacted land that can be designated for small-scale farming/ranching/aquaculture using new agricultural techniques. Locals will be trained to raise several types of domesticated livestock (goats, foul, pigs, tilapia) as well as to source indigenous forest products in an environmentally low-impact manner. Through these activities, jobs may be created in the following areas:

- Forest assessment and management
- Construction
- Agriculture
- Environmental services
- Equipment and facility maintenance/machinery and mechanics
- Alternative energy systems
- Communications, marketing and product distribution

All Jadora employees are chosen based on two criteria: skill level and ability to physically perform the job's requirements. Jadora has four main types of jobs (management, surveying/assessment, construction, and farming) that are ideally suited for individuals from communities in the project area.

Jobs with the Community Consultation Teams require a college degree in sociology and/or one or more years of field experience from working with communities. Jadora specifically hires people for the CCT management from outside the project area to reduce possibilities of bias.

With the exception of two staff members, all of Jadora's current forest carbon, biodiversity assessment, and agriculture teams were selected from different villages within the project area (see employee data sheet), allowing broad geographic coverage for employment. The current managers of the biodiversity and agriculture teams have been hired from within the project area because of their experience in the project area forest and the local farming conditions. In areas of the project where Jadora's forest carbon assessment teams have worked, the elders from nearby villages selected the individuals who then worked side by side with Jadora staff. Elders from the villages that are nearest to the construction work choose the workers that are then hired by Jadora for construction (i.e. Bongai Bridge reconstruction).

RDC is a highly stratified society in which there are strict gender roles. To avoid being culturally disruptive, Jadora does not seek to change the status of gender within the project area. Jadora does, however, seek to create employment opportunities and capacity building efforts that include marginalized segments of society, such as women. In particular, efforts in alternative farming techniques are ideally suited for women according to their status within the project area. Hiring women is a priority in running and maintaining the experimental farms. Discussions with women's groups have indicated a large demand for supplementary educational opportunities because few women know how to read, write or do simple arithmetic. Supplementary education will better allow them to run their own small-scale businesses and meet their financial needs.

Jadora is currently seeking new staff for the Community Consultation Teams. Given the importance of including women's voices in the project development process, Jadora is actively seeking women with a background in social development and project management at the University of Kisangani and the University of Kinshasa.

HIRING PROCESS
1. Identify job
2. Create job description including job requirements (skills, time, location of work, pay scale)
3. Advertise job through local network (village chiefs/elders, current staff)
4. Identify potential job candidates
5. Interview potential candidates
6. Hire

G4.5 Employment Laws

Laws and regulations on the protection of rights in the République Démocratique du Congo are contained in Act 015-2002 of October 16th, 2002, establishing the Labor Code and its implementing measures.

This law provides for and sets in place bodies for design, consulting, and charges to ensure application of the legal provisions regarding working conditions and the protection of workers in the year of their employment, such as the duration of labor, wages, security, hygiene and well being, employment of women, children and people with disabilities, conflict collective, individual labor disputes, application of collective agreements, representation of staff and other matters.

The execution of a project on land requires the Labor Code to serve as a tool for use in the regulation of relations with workers regarding their rights and duties, and for the corresponding sanctions where necessary to terminate the contractual relationship.

Outreach and information for workers on the scope of their social rights are contained in the Act and assigned to the Labor Inspector as a conduit between workers and the Employer, firstly, and secondly, the trade unions formed to protect the interests of workers.

The République Démocratique du Congo has ratified several international conventions that ensure successful execution of the project on national territory, including those related to the administration of labor, tripartite consultations to promote the implementation of international standards, labor clauses in contracts by a public authority, etc.

In respect to international conventions, the Constitution of the République Démocratique du Congo has in its articles that: “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 another party.”

G4.6 Employee Safety

The main risks to employee safety include exposure to environmental factors (pathogens - infectious and parasites) and dangerous animals. There is a remote risk of drowning during water travel because many Congolese employees do not know how to swim. We have implemented a corporate health care fund for mitigation of these risks, and plans are in the works to build a microbiology lab for diagnosis and treatment (see health care attachment). Safety guidelines will be formulated to address hazards associated with the job.

Table 13 Hazard Mitigation

Hazard	Mitigation
Machete cuts/wounds	Employees are instructed as to the proper use of machetes and the maintenance of appropriate distance from each other while using machetes.
Animal bites	Jadora keeps medical kits on hand. Employees are instructed not to pick up wild animals.
Pathogens/disease	Jadora provides medication for its employees. A microbiology lab for diagnosis and treatment of medical ailments is in the planning phase.
Drowning	Employees are provided with life jackets while on the water.
Dehydration	Employees are provided with water containers.

G4.7 Financial Health of Implementing Organizations

Jadora LLC is a United States registered limited liability company in the State of Washington. Jadora is governed by the corporation laws of Washington, which ensure that, at all times, the company remains financially solvent and able to meet its liabilities.

The company is owned by independent shareholders of good standing and has a Board of Directors. Jadora's operating funds are provided by private investors, and the company is sufficiently capitalized through its shareholders to ensure completion of the project. A detailed financial plan has been provided to the validator.

Safbois is private company registered in the République Démocratique du Congo. Its name is abbreviated in the RDC as an "S.P.R.L." which stands for "Société Privéeà Responsabilité Limitée," and thus, Safbois is correctly referred to as Safbois, S.P.R.L. The company maintains a simple ownership structure and has three shareholders: Daniel Blattner, David Blattner, and James Blattner. Safbois is sufficiently capitalized to cover its obligations of the project implementation costs.

G5 Legal Status and Property Rights

G5.1 Local Laws and Regulations

Jadora will comply with all applicable local, district and national labor standards. Within the Project Area, none of the proposed project activities violate any law. The land in the project area is owned by the government of Orientale Province of the RDC, and occurs within a logging concession leased to Safbois, the project proponent. The Project Proponent also owns the rights to sequestered carbon in the project area.

Laws and regulations on the protection of rights in the République Démocratique du Congo are contained in Act 015-2002 of October 16th, 2002, establishing the Labor Code and its implementing measures (see G4.5. above).

The République Démocratique du Congo has ratified several international conventions that can ensure successful execution of the project on national territory, including those relating to the administration of labor, tripartite consultations to promote the implementation of international standards, labor clauses in contracts by a public authority, etc. The Constitution of the République Démocratique du Congo has in its articles that: "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 another party."

The planned legal arsenal in the Land and Forest Codes gives guarantees sufficient for the implementation of the project, after obtaining the required authorizations and titles of occupations, without risk of eviction for the time they are in effect.

G5.2 Documentation of Legal Approval

Jadora warrants that all actions and documentation for the project establishment as a carbon sequestration project have and will be met. The Isangi project has received government endorsement, and Jadora has provided its verifier with its *letter d'attestation* from the Congolese government.

G5.3 Guarantees Regarding Property Encroachment/FPI Consent

The project will not encroach uninvited on private property, community property or any other government property. The land in the project area is owned by the government of the Orientale Province of the RDC and occurs within a logging concession leased to Safbois. Traditional law has historically regulated forest management and access to land, and thus Jadora has worked with the local communities in designing the project.

Before beginning development on the project, Jadora first identified which communities would likely be impacted by its activities. Jadora then held community meetings explaining climate change, the role of forests, and the REDD process. In addition, the villages were able to discuss how they might be impacted by the project and which benefits they would like to see from it. Jadora has designed the project with input from the villages, and we are now holding participatory mapping sessions to gain a better understanding of the forest resources and boundaries from a local perspective.

G5.4 Involuntary Relocations

The Isangi project does not require or involve the involuntary relocation of people or of the activities important for their livelihoods or culture. The project will work toward agricultural intensification to increase yield per agricultural area, reducing the need for further deforestation.

G5.5 Illegal Activities

Subsistence agriculture – essentially squatting on government-owned, privately leased land – is technically illegal but is effectively unenforced by the government. To reduce these activities, Jadora is encouraging the development of alternative incomes to non-intensified agriculture and charcoal production. These include livestock husbandry, aquaculture, and services such as clothing repair, home building, etc. Jadora is developing a project participation procedure by which local villagers register to participate in return for access to seeds of improved crop varieties, veterinary care for livestock, livestock husbandry equipment (netting, corrals, etc.), microfinance for agricultural intensification, etc. Participants will join a land use plan for the cleared and forested land in the project area.

Jadora's partner, Safbois, has agreed to halt commercial (legal) logging in the project area. The local people lack the technology for illegal commercial logging.

G5.6 Carbon Rights

The Isangi project has received government endorsement and authorization that Jadora/Safbois SPRL owns the rights to use carbon credits generated on their logging concessions and the right to pursue this alternative revenue option. Documents pertaining to commercial rights to the project area have been provided to the project validators.

CLIMATE SECTION

CL1 Net Positive Climate Impacts

The key project activities that will drive emissions reductions are:

(1) Developing a project participation procedure by which local villagers register to participate in return for access to seeds of improved crop varieties, microfinance for agricultural intensification, etc. Participants will join a land use plan for the cleared and forested land in the project area.

(2) Through micro-finance, demonstrations, and other methods, encourage the development of alternative incomes to non-intensified agriculture and charcoal production. These alternatives include aquaculture and services such as clothing repair, house building, etc.

(3) Demarcation and patrol of project area boundaries.

(4) Cessation of commercial logging.

(5) Assisted natural regeneration of forest in planned areas.

Based on detailed calculations in Methodology VCS-VM0006 we expect to reduce deforestation rates with these activities in the project area by 75%.

CL1.1 Net Change in Carbon Stocks

<u>Emissions from Project Activities</u>
New emissions will come from three sources: increased use of vehicles, removal of biomass to assist natural regeneration. Vehicle use assumes three vehicles in the project area initially, which will use one 80 liter tank of fuel each week for 52 weeks. The emission factor is 1.83 x 10^{-4} tons CO_2e per liter (IPCC 2000). We expect vehicle use to increase by 8% per year either by adding more vehicles or more trips each year.
Vehicle use assumes three vehicles in the project area initially, which will use one 80 liter tank of fuel each week for 52 weeks. The emission factor is 1.83 x 10^{-4} tons CO_2e per liter (IPCC 2000). We expect vehicle use to increase by 8% per year either by adding more vehicles or more trips each year.

We anticipate clearing each year up to four tons of shrub species or other woody vegetation per ha that can inhibit the growth of native trees in areas with natural regeneration. We anticipate removing vegetation from 100 hectares per year within the project budget, targeted at areas with the greatest need for removal. The emission factor is 1.83 tons CO_2e per ton of vegetation removed.

Table 14 Net Emissions From Project Activities.

Year	Emission from Vehicles (tCO_2e)	Biomass loss from ANR (tCO_2e)	Net Sequestration of CO2e from ANR (tCO_2e)	Project Land Use Change Emissions (tCO_2e)	Net Emissions Project Activities (tCO_2e)
1	2	733	-7111	104,783	98,407
2	2	733	-14,223	114,046	100,559
3	3	733	-21,334	124,127	103,528
4	3	733	-28,446	135,095	107,386
5	3	733	-35,557	147,031	112,210
6	3	733	-42,583	160,017	118,170
7	4	733	-42,583	174,146	132,300
8	4	733	-42,583	189,518	147,672
9	4	733	-42,583	206,241	164,395
10	5	733	-42,583	224,433	182,588
11	5	733	-42,583	244,222	202,377
12	5	733	-42,583	265,747	223,902
13	6	733	-42,583	289,158	247,313
14	6	733	-42,583	314,617	272,774
15	7	733	-42,583	342,303	300,460
16	7	733	-42,583	372,407	330,565
17	8	733	-42,583	405,137	363,295
18	8	733	-42,583	440,718	398,876
19	9	733	-42,583	479,393	437,552
20	10	733	-42,583	521,426	479,586
21	11	733	-42,583	567,102	525,263
Total	**115**	**15,400**	**-78,8005**	**5,821,667**	**5,049,178**

Assisted natural regeneration will occur on woodland and cropland land use strata within the project area as driven by choices of individual farmers to abandon fields. Thus we cannot target specific landscape pixels for ANR. Following literature studies of regeneration in tropical lowland rainforests and estimates from secondary growth areas in our 362 forest inventory plots, we conservatively assume that assisted naturally regenerating (ANR) forest will require twenty years to reach 70% of the mean carbon density for upland forest (365 tons/hectare). We expect assisted natural regeneration to be occurring on up to 1,000 hectares within the project area in any given time, with 167 hectares of new ANR generated each year. Annually, the annual sequestration of CO_2 by ANR = 0.7 * (1000 ha) * (840 tCO_2e/ha)/20 years.

For emissions from activities shifted to outside the project area (leakage), see Section CL2 below.

Summary of GHG Emission Reductions and Removals

Analysis of GHG emission or reduction sources showed that, over the lifetime of the project only net conversion of forest to non-forest (61.4%), ceased selective logging (20.9%), and assisted natural regeneration (12.3%) were significant, as they cumulatively accounted for 98% of all emissions.

Net emissions in the baseline scenario were obtained from the sum of net conversion of upland forest to cropland multiplied by its emission factor plus net emissions from commercial logging. Net emissions from land use change in the project scenario were obtained by multiplying net baseline land cover transitions by 75%, the mean effectiveness of project activities, and subtracting reductions from assisted natural regeneration (Table 14). Leakage emissions were calculated by subtracting the net conversion of upland forest to cropland in the leakage area under project conditions (see section CL2 below) multiplied by its emission factor from the sum of project scenario net conversion of upland forest to cropland in the leakage area (see section CL2) multiplied by its emission factor. Net GHG reductions or removals were calculated by subtracting the sum of net project scenario emissions and leakage emissions from baseline emissions.

Table 15 Net Greenhouse Gas Emissions under Baseline, Leakage, and Project Scenarios.

Year	Net Emissions Baseline Scenario (t CO_2e)	Net Emissions Project Scenario (t CO_2e)	Leakage Emissions (t CO_2e)	Net GHG Reductions or Removals (t CO_2e)
1	508,732	104,783	41,578	362,371
2	545,785	114,046	45,254	386,485
3	586,106	124,127	49,253	412,726
4	629,981	135,095	53,606	441,280
5	677,722	147,031	58,342	472,350
6	729,667	160,017	63,495	506,156
7	786,184	174,146	69,101	542,937
8	847,672	189,518	75,201	582,953
9	914,565	206,241	81,836	626,487
10	987,334	224,433	89,055	673,845
11	1,066,490	244,222	96,907	725,360
12	1,152,588	265,747	105,448	781,393
13	1,246,231	289,158	114,738	842,335
14	1,348,070	314,617	124,840	908,612
15	1,458,813	342,303	135,826	980,684
16	1,579,229	372,407	147,771	1,059,051
17	1,710,148	405,137	160,758	1,144,253

18	1,852,471	440,718	174,877	1,236,876
19	2,007,171	479,393	190,223	1,337,555
20	2,175,303	521,426	206,902	1,446,976
21	2,358,008	567,102	225,026	1,565,880
Total	**25,168,269**	**5,821,667**	**2,310,038**	**17,036,564**

CL1.2 Net Changes in Non-CO_2 Gases

No other greenhouse gas emissions other than CO_2 are affected by project activities.

CL1.3 Other GHG Emissions from Project Activities

No GHG emissions other than those previously mentioned are considered to result from the project activities.

CL1.4 Positive Net Climate Impact

As demonstrated in Sections CL1.1 and CL1.2, the project will provide clear positive net climate impacts. Management's most conservative estimates show that the project will avoid approximately six (6) million ton of CO_2e emissions over the 21-year life of the project. The project will end commercial logging in the project area and help local people develop alternative livelihoods, reducing subsistence agriculture and pressure on the forest.

CL1.5 Avoidance of Double Counting

Emissions reductions in this project will not be double counted because each emission reduction credit (1 tCO_2e) will be registered with the Verified Carbon Standard and receive a unique serial number. Upon purchase, that serial number is transferred and cannot be re-used. VCS credit verification procedures, which include audit by an independent third party, explicitly prevent offsets from a given project from being claimed from another registry.

CL2 Offsite Climate Impacts

CL2.1 Types of Leakage

The primary source of leakage in this project is the movement of people and consequent deforestation outside the project area. Because no deforestation is allowed in the project area, the leakage cancellation rate at the project border is conservatively estimated as 1.0. Because subsistence agriculture is projected to be by far the primary driver of deforestation in the project and reference area, its relative leakage impact is 1.0. The other drivers of deforestation account for less than 1% of baseline emissions.

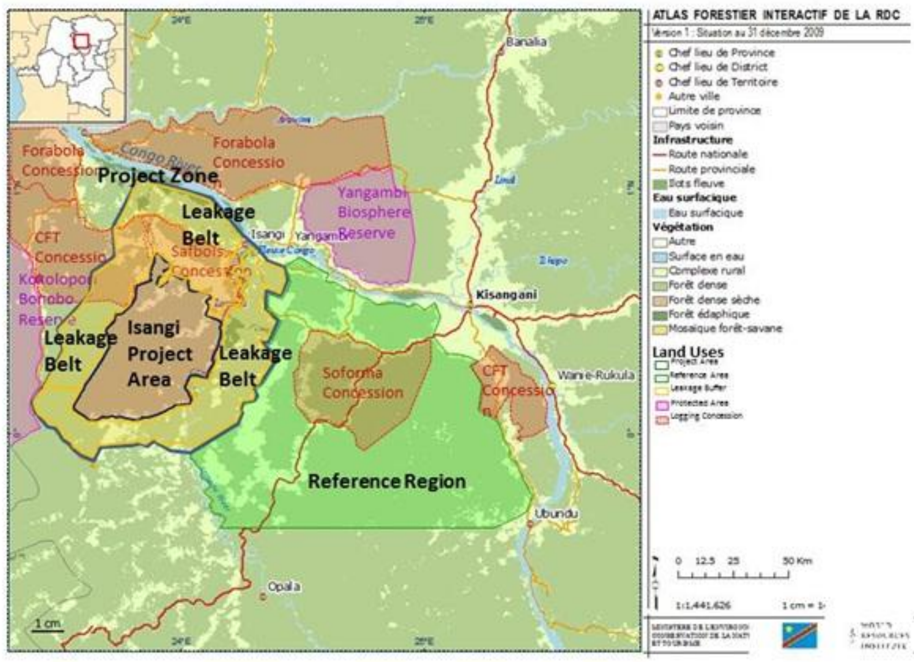

Figure 17 **Map of land use classes and forest strata, clearly indicating the leakage belts associated with the project area.**

Leakage from displaced shifting agriculture

The likelihood of smallholder farmers moving out of the project area and clearing forests This likelihood was well-predicted by a spatial model of probability of forest clearing as a function of distance to different landscape features, e.g., roads, rivers, villages/towns, and forest edges, and avoidance of wet forest. The model clearly suggests a leakage belt surrounding the project area (Figure 11) that occupies 1.89 times the project area. This leakage belt was assumed to be 30 kilometers along an orthogonal line (at a 90^o angle) from the project area boundary. We used 30 kilometers because social surveys suggest that that is the maximum distance a family would typically travel in one day. However, the boundary was placed at any point along the orthogonal line more than 25 kilometers from the project area boundary where one of the landscape features, found to significantly explain upland forest to crop or woodland transition in the logistic regression model of land use change (Equation 4) occurred, such as a road, forest edge, settlement, or navigable river. We assumed that such features would fully discourage further movement away from the project area, since a high probability of deforestation is associated with proximity to these features. In addition, we extended the width of the leakage belt boundary if the orthogonal line intersected a wet forest area, since wet forest is not converted and that a person/family would presumably move completely to the opposite side of wet forest-occupied area.

Leakage from activity shifting or market leakage due to logging

Another potential source of activity-shifting leakage would be a shift in logging activities by project proponent Safbois to another or a new logging concession. Similarly, other logging interests could increase harvest on other concessions in the RDC, creating market leakage. Both of these types of leakage are very unlikely in the case of the RDC. Profitable logging concessions are constrained to be near the Congo River because no roads or railroads are available to haul bulk timber to ports on the Atlantic Coast. Areas of upland forest with the most desirable timber species between the large swamp forests of the lower Congo and Kisangani (below Stanley Falls) are virtually saturated with concessions (Figure 18). Consequently, there is little opportunity for Safbois to shift activity to a new concession. Also, the vast majority of these concessions, which have a 25 year term, were renewed after the year 2000, and so are unlikely to turn over and be logged more intensely. Finally, selective logging is the standard practice along the middle Congo because of the cost of transporting logs on barges (see Safbois profit and loss statement in the section on additionality) relative to the price for wood, and so there is little flexibility in how much timber can be harvested and transported (Peres et al. 2006). Overall, there is limited capacity for logging interests or project proponent Safbois to shift or alter logging activity, and thus activity-shiting and market leakage are likely below 5% (de minimis) (VCS 3 Program Guide 3.0) of the expected emissions reductions of the project.

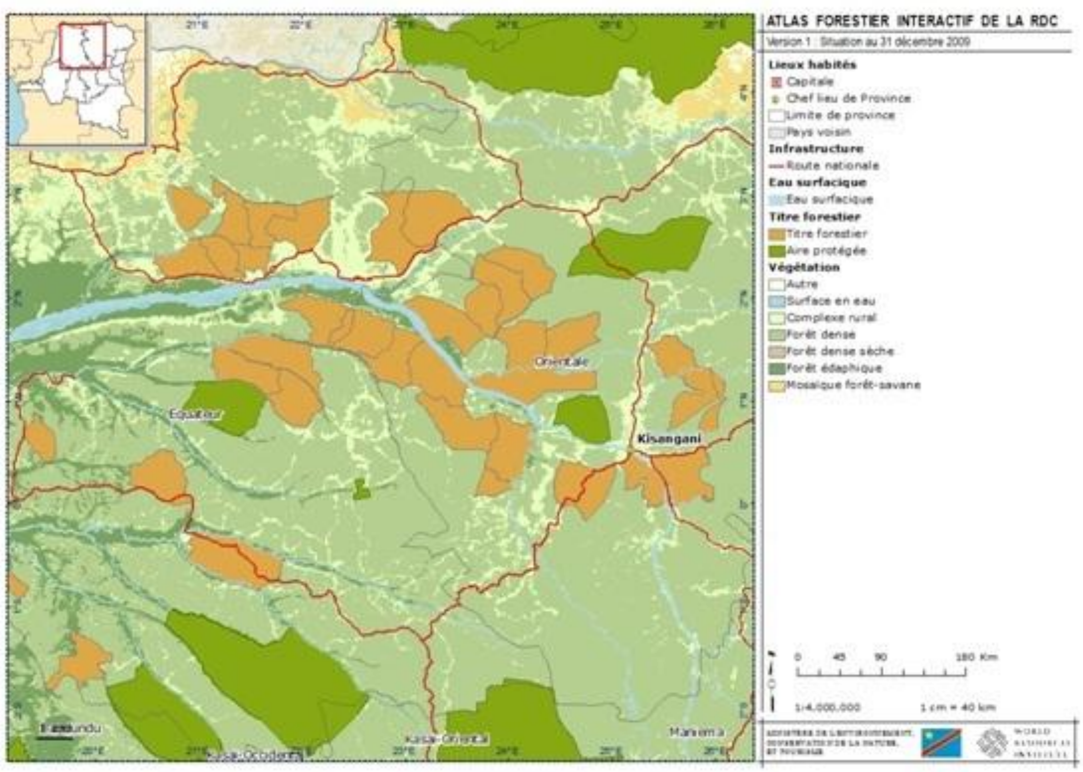

Figure 18 Map of logging concessions (light brown) and protected areas (bright green) along the middle Congo River, showing the saturation of river access from upland forest (light green) necessary for transporting premium logs in the absence of major roads or railroads.

CL2.2 Mitigation of Negative Offsite Impacts

The most likely form of leakage is increased agricultural activities in surrounding areas. Because movement of locals is limited, large-scale leakage of activities such as artisanal logging is unlikely. The project activities will take place within the two Safbois concessions and will extend to the leakage belt and reference region when appropriate.

<u>Activities to Reduce Agricultural Leakage</u>

To reduce the area of forest cut down for subsistence agriculture, Jadora will be introducing alternate agricultural techniques that will increase the yield and length of time a field can be used before going fallow. The aim is to reduce the area of forest being cut down by helping farmers produce more food, in small areas, over longer periods of time.

<u>Activities to Reduce Charcoal Production</u>

To reduce leakage of production of charcoal Jadora will distribute fuel-efficient wood/charcoal stoves throughout the villages within the project and leakage areas.

CL2.3 Unmitigated Negative Offsite Climate Impacts

To calculate deforestation rate in the leakage area, we conservatively assumed that the probability of traveling a given distance in the leakage area p_L was the same as the decline in probability with distance from a settlement. We further assumed that people would move to the edge of the project area in accordance with the attractiveness of the pixel from the perspective of distance from a road, forest edge, settlement, or navigable river.

$$\ln(p_L/(1-p_L)) = Y_L = -6.33 + 0.25T - 0.21 * (\pm 0.10) * \ln(\text{DISTPROJBOUND}) - 0.33 * (\pm 0.13) * \ln(\text{DISTROAD}) - 0.41 * (\pm 0.16) * \ln(\text{DISTRIVER}) - 0.83 * (\pm 0.38) * \ln(\text{DISTEDGE}) - 0.21 * (\pm 0.10) * \ln(\text{DISTSETT}) \quad (5)$$

Where p_L is the above-baseline deforestation probability of a pixel in the leakage area, DISTPROJBOUND is distance from the project boundary and T is project year (which accounts for the increase in baseline deforestation rate over the project lifetime). We calculated the average probability of converting upland forest occupied pixels in the leakage area by adding p_B from equation (4) and p_L from equation (5) for pixels in the leakage area to obtain the total deforestation probability in the leakage area p_{TL}. Analysis showed that p_L increased the value of p_{TL} by an average of 50% within the first 5 kilometers outside the project area on average and increased it by a total of less than 5% outside this distance, such that a simple approximation for $p_{TL} = 1.083\ p_B$ averaged over the whole leakage area.

Table 16 Absolute deforestation for the leakage areas under baseline and project scenarios.

Year	Baseline (ha)	Project Scenarios (ha)
1	182	200
2	230	252
3	290	318
4	363	398
5	451	494
6	556	608
7	678	741
8	817	893
9	972	1,063
10	1,140	1,247
11	1,317	1,440
12	1,498	1,638
13	1,678	1,834
14	1,850	2,022
15	2,010	2,197
16	2,155	2,355
17	2,284	2,496
18	2,395	2,617
19	2,489	2,720
20	2,568	2,806
21	2,633	2,877

All land transitions for the leakage area under the baseline and project scenarios are shown in Table 17.

Table 17 Estimated transitions in land use and land cover in the leakage area over the Isangi Project lifetime.

Year	Baseline Transition (ha/yr)						Leakage (ha/yr)					
	UFCR	WOCR	UFWO	CRWO	CRUF	WOUF	UFCR	WOCR	UFWO	CRWO	CRUF	WOUF
1	210	15	26	15	28	5	228	15	26	15	28	5
2	265	18	33	19	35	6	287	18	33	19	35	6
3	333	22	40	23	43	7	361	22	40	23	43	7
4	415	27	49	28	52	9	450	27	49	28	52	9
5	514	33	59	34	63	11	557	33	59	34	63	11
6	632	40	71	40	76	13	684	40	71	40	76	13
7	768	47	85	48	91	15	832	47	85	48	91	15
8	924	56	100	57	107	18	1,001	56	100	57	107	18
9	1097	65	117	66	125	21	1,188	65	117	66	125	21
10	1284	75	135	77	144	24	1,391	75	135	77	144	24
11	1481	86	153	87	164	27	1,604	86	153	87	164	27
12	1682	96	172	98	184	31	1,822	96	172	98	184	31
13	1881	106	190	108	203	34	2,037	106	190	108	203	34
14	2071	116	207	118	222	37	2,243	116	207	118	222	37
15	2249	125	223	127	239	40	2,436	125	223	127	239	40
16	2410	133	238	135	254	42	2,610	133	238	135	254	42
17	2552	140	250	142	268	45	2,763	140	250	142	268	45
18	2674	146	261	148	279	46	2,896	146	261	148	279	46
19	2778	151	270	153	289	48	3,009	151	270	153	289	48
20	2865	155	278	158	297	49	3,103	155	278	158	297	49
21	2937	159	284	161	304	51	3,181	159	284	161	304	51

WFCR = wet forest to cropland
UFCR = upland forest to cropland
WOCR = woodland to cropland
WFWO = wet forest to woodland
UFWO = upland forest to woodland
CRWO = cropland to woodland
CRUF = cropland to upland forest
WOUF = woodland to upland forest
Note: cropland or woodland to wet forest and wet forest to cropland or woodland never occurred and were eliminated for simplicity

Leakage for geographically unconstrained deforestation drivers

The only significant geographically unconstrained driver of deforestation is migration. Given that the baseline emissions calculations indicate a rapid increase in deforestation rate of 23% per year (note this is the rate of increase in the rate, not the actual rate), this rapidly outstrips human population growth rate in the region (3% increase per year) and almost certainly includes migration of people into the project area, leakage belt, and reference region. Consequently, we strongly believe that the influence of geographically unconstrained drivers is already included in the baseline emissions estimates. There are no other leakage sources for this project.

Leakage from ceased logging

Because there is only one financial concern engaged in commercial logging (Safbois), and this concern is a project participant, there is no activity shifting leakage attributed to cessation of logging to reduced forest degradation. Safbois agrees not to shift commercial logging activity that would have occurred in the project area to other areas of the RDC.

Leakage from emissions for rice, fertilization, and livestock from leakage prevention measures.

Refer to Section CL2.4.

Leakage emissions from displaced deforestation in the leakage belt were added to determine leakage emissions under the project scenario in calculating net greenhouse gas reductions and removals (see Table 12).

CL2.4 Unmitigated Negative Offsite Non-CO_2 Climate Impacts

<u>Leakage from emissions for rice, fertilization, and livestock from leakage prevention measures.</u>

Rice cultivation and fertilization will not add emissions because the leakage area contains very few areas suitable for rice cultivation, and the only fertilizers that the project will encourage will be phosphorus-based, which produce no added emissions. The project will not target animal husbandry practices and thus should have no direct effect on methane emissions either in the project area or leakage belt.

CL3 Climate Impact Monitoring

CL3.1 Carbon Pool Selection & Monitoring

The forest will be monitored using remote sensing, a grid of 548 forest carbon plots measuring the carbon content of the forest, and a suite of monitoring strategies to track farming activity and charcoal production within the reference area, the leakage buffer, and the concession itself. While models of carbon savings will be created to predict the impacts, empirical evidence from the concession and similar control areas outside of the project will be used at verification to confirm the carbon savings generated.

The 548 plots are divided between two areas. The first area is 135,000 hectares and has 496 plots, and the second area is 30,000 hectares and has 52 plots. The plot site locations are determined by using satellite imagery that encompasses all forest LULC's in the area. To avoid site selection bias, the placement of plots was determined *a priori* using a 2009 satellite image with Arc view. A grid system was overlaid on to the satellite image and the intersection of the grid lines is where the plots are located. The location of each of the line intersections was determined, coded, and programmed into Garmin GPS 60 CSX [Lat/Long (hours minutes, seconds) WGS 84].

The pools monitored in the forest carbon plots will include aboveground woody biomass and lying dead wood. Teams of local foresters are being trained to conduct the monitoring with oversight from the project management team as necessary to achieve the precision required by best practices (e.g. MacDicken 1997). Because of the diversity and remote location of the forests at Isangi, the equations that estimate forest biomass (Djomo et al. 2010) will need to be tested by destructive sampling of some of the trees in the area.

Jadora will continuously track both the rate of deforestation and changes in LULC. Woody live and dead biomass in intact forest will be measured every three years. Rates of deforestation in the project area and leakage belt, methane emissions from livestock, and assisted natural regeneration will be measured annually. The project baseline deforestation rate will be reassessed and submitted every ten years for third party verification. Jadora expects a rapid increase in deforestation rates with the post-conflict expansion of human activity in the RDC and rapid human population growth in the reference region. Jadora will conduct an annual internal review of deforestation rates to produce data driven models of deforestation in relation to project activities. The models will allow Jadora to better understand which project activities and locations have been effective at reducing reforestation rates. Additionally, these reviews will help Jadora better understand which areas need greater focus and resources to further reduce deforestation.

Table 18 Measurement Methods.

Data Unit	Measurement Method
Aboveground large tree biomass	Estimated using mensuration formulas that convert diameter at breast height to wood mass.
Lying dead wood	Line intersect method.
Deforestation rate (%)	Satellite images are used to classify land cover types. Images from different years are compared to determine changes in land cover type. Deforestation is measured from the change of upland or wet forest to cropland, woodland or settlement.
Deforestation rate (%) in the leakage belt	Satellite images are used to classify land cover types. Images from different years are compared to determine changes in land cover type. Deforestation is measured from the change of upland or wet forest to cropland, woodland or settlement.
Methane emissions from livestock	Livestock numbers from village surveys and censuses will be multiplied by animal mass for respective species and converted to annual methane emissions using IPCCC 2006 formulae for conversion, and an emission factor of 23 to convert to CO_2e.

We will identify 150 new forest plots in the leakage belt in which to quantify standing stocks of forest carbon. We will also conduct village surveys to determine implementation of alternative livelihoods and, in particular, adoption of alternative farming practices and livestock husbandry. These surveys will be conducted annually. The current monitoring plan, including standard operating procedures to measure the biomass pools and other variables, has been made available to the validator.

CL3.2 Monitoring Plan

Jadora is committed to elaborating its monitoring plan and creating a fully detailed monitoring plan within twelve months of validation and to make that plan available to the public. We will also communicate the plan to local community representatives for wider dissemination.

COMMUNITY SECTION

CM1 Net Positive Community Impacts

CM1.1 Estimated Impacts on Communities

Social Impact Assessment (SIA)

Jadora is currently collecting data to conduct social impact assessment. Data collection is by the Community Consultation Team (CCT). The methodology is used is based on the Social and Biodiversity Impact Assessment (SBIA) and Social Carbon Methodology (SCM) protocols and focuses on the Sustainable Livelihoods Framework (SLF).

As the project continues to develop over its 30 plus years, Jadora expects to adjust existing programs and implement new ones in order to best serve the long-term needs of the communities in the project area. Jadora does not see this as a static project but instead one based on a continual feedback loop and a long-term vision that will allow Jadora to adjust and add programs to increase overall human, natural, social, physical, and financial capacity. This approach will reduce deforestation in transformational ways and leave a foundation upon which to build long after the original project has ended. Additional information is available in the Appendix of this document.

CM1.2 Impact on High Conservation Values

Through in-depth on-the-ground data collection and understanding of the project areas natural environment, Jadora has been able to identify HCV areas within the project boundaries and the surrounding leakage and reference areas. By working with local populations and villages to determine boundaries for agriculture and other human uses within the forest, such as hunting or harvesting wood for fuel and building purposes, Jadora will be able to ensure no HVC areas will be negatively impacted. Additionally, Jadora is partnered with Safbois and can ensure that any legal harvesting of wood products does not affect HVC areas.

CM2 Offsite Stakeholder Impacts

CM2.1 Potential Negative Impacts on Offsite Stakeholders

Impacts outside the area of the project will also be positive. The innovations we will introduce will become more widely available over time, as foods and other products circulate in the dispersed market networks that indirectly connect villages. For example, bug-resistant varieties of a traditional food like cassava (manioc) will migrate out of the project zone, and provide a positive impact that emanates from the Isangi market system to neighboring villages, especially to the north, east, and southeast. The impact our project's community development plans will have on those not involved in villages beyond Isangi we anticipate to be positive, as some of these positive impacts reach the surrounding settlements. It is not anticipated that our project impact will increase deforestation in adjacent villages because it will not displacing people or encourage migration.

CM2.2 Plans to Mitigate Potential Negative Offsite Impacts

No negative social impacts on the communities outside of the project area are expected. In the event that negative impacts arise, the Community Consultation Teams will work with the impacted community to find solutions and, if necessary, follow the grievance processes.

CM2.3 No Net Negative Impacts on Offsite Stakeholders

No unmitigated social or economic impacts are expected from the project.

CM3 Community Impact Monitoring

CM3.1 Community Impact Monitoring Plan

The impacts of the program will be monitored through informal and formal consultative conversations with the people of the villages by way of surveys in households, at markets and paths to markets, and in health clinics. This process will allow the program to map out economic shifts away from forest products and toward sustainable alternatives. Additionally, monitoring will be conducted by a yearly review of Jadora programs as they reflect a Sustainable Livelihoods Framework (SLF). The Community Impact Monitoring Plan has been provided to the validators.

CM3.2 HCV Monitoring Plan

A monitoring plan to measure the effectiveness of the maintenance or enhancement of High Conservation Values related to community well being has been provided to the validators.

CM3.3 Commitment to Develop Full Monitoring Plan

Jadora commits to developing a full monitoring plan within twelve months of validation against CCB Standards and to make that plan publicly available on the Internet. We have already begun the process of developing a full monitoring plan for the social impact of the project area. As the project proceeds, Jadora will use the input gathered by the CCT to continually improve the monitoring process and ensure changes to the process have positive impacts on the populations within the project area.

BIODIVERSITY SECTION

B1 Net Positive Biodiversity Impacts

The project reduces deforestation in 240,000 hectares of intact primary rainforest. Rainforest systems are of global importance as reservoirs of biodiversity and carbon stocks. The project will include a restoration and monitoring team that will create recovery plans for wildlife populations in the area. The primary mechanism will involve creating reserve areas where hunting is halted and then providing a system through which hunting can be managed and maximized. This program will take time to develop and will require collaboration, ownership, and cooperation from the local territorial government and from the village communities in order to be successful.

1. Estimated Biodiversity Impacts

There will be a net positive impact on faunal biodiversity within the project area. This will be accomplished by providing the locals with alternative protein sources, therefore reducing bush meat hunting. Work is commencing on a tilapia pond that will serve to stock smaller ponds that villagers in the project area may construct on their property. Jadora will send a veterinarian experienced in raising livestock to the project area. S/he will supply common medications necessary to ensure the survival of the animals and also to increase their productivity. As access to stable protein sources increases, there should be a concomitant decrease in hunting pressure in the surrounding forest system.

There will be a net positive impact on floral diversity as compared to the non-project scenario because the project aims to reduce deforestation, and deforestation inherently reduces floral diversity.

A baseline study of faunal diversity within the project area is in progress (see SOP for faunal diversity surveys). Typically biodiversity quality is assessed by the presence versus absence of a species and by evidence of hunting. Jadora team members are working in a systematic format, identifying animal tracks, signs and scat, the actual presence of animals within a specific area, and the number of observed snares and traps. Market surveys are being conducted to assess the quantity and variation in the bush meat trade (See SOP for Market Surveys).

Faunal Diversity assessment:
The faunal biodiversity team documents all of the findings within a field notebook in French, and the information is translated and entered into a faunal spreadsheet. All sightings have GPS coordinates attached. In addition to documenting the wildlife observed within the forest, to team also documents human activity. Hunters and fishermen and their traps, nooses, snares and camps are noted.

Market surveys are being conducted to assess the quantity and variation in the bush meat trade. The amount and type of bush meat is observed and photographed if possible.

Day of the Week	Market
Monday	Yeakela
Tuesday	Djabir
Wednesday	Yafira
Thursday	Yanguba and Isangi
Friday	Djabir
Saturday	Elambi
Sunday	Yaboila

Isangi has a small daily market, but on Thursday the market expands to include people traveling to sell goods there.

As the project continues, Jadora predicts there will be an increase in the presence and sign of animals in the forest and a reduction in the observed snares and traps as well as a reduction in the volume of bush meat in the markets.

2. <u>No Negative Impacts on HCVs</u>
The project's goals include protecting and enhancing the forest and biodiversity, and thus High Conservation Values within the project area will be positively affected by the project. The project will minimize hunting and enhance protein sources, and the overall effect of the project will increase wildlife within the project area. Additionally, as the project activities reduce deforestation in the project area, the forest will better maintain its integrity and ability to support floral and faunal diversity.

3. <u>Species Used by the Project</u>
The agricultural program will not introduce any new plant or animal species in the area. The plant agricultural program aims to increase productivity through "no burn" techniques, cross cropping, and crop rotation. Crops will include *Zea mays* (Corn), *Oryza glaberrima* (Afircan Rice), *Glycine max*, (Soy Beans) *Vigna unguiculata* subsp. *unguiculata* (Niebe), *Ipomoea batatas* (Sweet Potatos), *Arachis hypogaea* (Peanuts/Ground Nuts), *Ananas comosus* (Pineapple), and *Manihot.esculenta* (Casava). All of these species are globally widespread and are not invasive.

. All species in the program are common agricultural species already in use: *Capra aegagrus hircus* (Goat), *Ovis aries* (sheep), *Gallus gallus domesticus* (chickens), Family *Anatidae* (Ducks), *Sus scrofa domesticus* (Pig), and *Tilapia nilotica* (Tilapia). The program will aim to reduce animal loss from disease rather than introduce new species.

4. <u>Exotic Species Used by the Project</u>
There will be no new exotic species used in the project area. The fishpond project will be using *Tilapia nilotica* (Tilapia) that is native to Central Africa including the RDC.

5. <u>Genetically Modified Organisms</u>

No genetically modified organisms will be used in the project.

B2 Offsite Biodiversity Impacts

1. Potential Negative Impacts on Offsite Biodiversity

There is potential of leakage hunting outside of the project area. There are no anticipated offsite negative impacts or leakage from the agricultural program because it works to increase agricultural productivity rather than to reduce farming area.

2. Mitigation of Potential Negative Impacts on Offsite Biodiversity

The project plans to introduce alternative farming techniques to reduce deforestation and provide educational outreach to surrounding areas. As aquaculture/tilapia farming increases in the project area, new protein sources can be sold in surrounding areas, reducing hunting pressure. Additionally, the aquaculture program will disseminate information, and as tilapia stocks increase, they can be introduced to surrounding areas.

3. Unmitigated Potential Negative Impacts on Offsite Biodiversity

There is potential for unmitigated negative offsite biodiversity impacts such as hunting; however, the impacts are anticipated to be minimal. The benefits from the aquaculture program will reduce the need for hunting in the project area as well as reduce hunting pressure in the leakage belt. These benefits are expected to greatly outweigh any negative biodiversity impacts from minimal leakage hunting.

The aquaculture program aims to reduce the cost of tilapia farming to below the cost level for hunting, hence increasing protein production. The main program will establish fishponds and create an outreach program on how they are built and how to increase fish production.

B3 Biodiversity Impact Monitoring

1. Biodiversity Impact Monitoring Plan

The Biodiversity Impact Monitoring Plan has been provided to the validators.

2. HCV Monitoring Plan

The HCV Monitoring Plan has been provided to the validators.

3. Commitment to Plan for Biodiversity Monitoring

Jadora is committed to continuing its current monitoring plan. Forest and market surveys will continue as discussed previously. There will be yearly reports on deforestation rates and faunal surveys discussing change over time and area.

All results will be posted in English and in French on the Jadora website and independent websites, and hard copies will be produced for stakeholders who do not have access to the Internet. Communication to local communities will be done through on-site meetings.

GOLD LEVEL SECTION

GL1 Climate Change Adaptation Benefits

GL1.1 Likely Regional Climate Change Variability

Primary forests in the Congo Basin are not currently overly threatened compared to many other rainforest regions and other biomes, such as semi-arid rangelands, conifer forests, etc. However, increases in rainfall variability and temperature are expected for the next 30-80 years in equatorial regions.

GL1.2 Identification of Risks to CCB Benefits and Mitigation Strategies

Likely climate change variability in the form of flooding poses a risk to the Isangi project's climate, community and biodiversity benefits. Jadora will identify those locations in the project area that are at risk of flooding. Project management will be careful to locate community centers and project activities related to agriculture and aquaculture away from flood-prone areas.

GL1.3 Demonstration of Current or Anticipated Climate Change Impacts

The likely regional climate change variability and risks mentioned above (Sections GL1.1 and GL1.2) are equally applicable to the project area and project zone and are likely to have an impact on the wellbeing of communities.

These potential climate effects may impact people living in the Congo largely through their effects on agriculture. More variable rainfall may cause occasional crop failures and lead to an increased reliance on the forest for cash products such as bush meat and charcoal. Such increases would further pressure biodiversity and could lead to accelerated deforestation rates, thereby further exacerbating soil degradation and permanent loss of agricultural potential near population centers.

Another possible impact of climate change in the form of more variable rainfall is an increased proportion of time where rivers are not navigable and the few existing roads are flooded.

GL1.4 Demonstration that Project Activities Assist in Climate Change Adaptation

Economic diversification and generation of local economies (not commodity economies with large middlemen) should make local people better adapted to potential climate change. The Isangi REDD project proposes education and improved agricultural intensification so as to extend the useful life of cleared forest plots. These improvements, along with adoption of aquaculture practices to produce alternative protein sources could all serve to mitigate the impacts of climate change on the rural people of the Congo.

Another possible impact of climate change in the form of more variable rainfall is an increased proportion of time where rivers are not navigable. With the virtual absence of road or rail infrastructure in the Congo Basin, rivers are key transportation routes, and a loss of navigation could restrict access to markets for cash crops like palm oil, timber, or foodstuffs. The local development of economies in remote villages that we expect to arise from our project activities should help mitigate the climate change-derived potential loss of access to markets.

GL2 Exceptional Community Benefits

GL2.1 Demonstration the Project is in a Low Human Development Country

The UNDP puts the Congo one above the bottom of the Inequality-adjusted Income index, at 0.070, as well as Life Expectancy at Birth, at 48 years. The UN's PPP USD $1.25 per day measure of poverty puts almost 60% of the Congolese people below the national poverty line. In the Isangi Territory, many people live off of cassava, tubers, plantains and grains, resulting in widespread protein deficiency. The poorest children in the project area, who on average make up a quarter to half of the people in a village, show signs of serious to severe malnutrition, including visible upper ribs, distended livers, herniated navels, and in about one in ten, the reddish hair of Kwashiorkor, a protein deficiency pathology that can be fatal. Accordingly, the children suffer a higher share of the numerous and serious infirmities of the region. Their severe poverty symptoms indicate that the lower end of the wealth continuum in these villages is exceedingly low, even for the RDC.

GL2.2 Demonstration of Project Benefits to Poorest Communities

Jadora's community development program focuses on education, health services and agriculture, and the services and benefits are bestowed upon a community rather than to, or through, an individual. Currently, the schools and health facilities in the villages are poorly developed (or non-existent) and are available only to these that can pay. Jadora is committed to building new schools, providing free educational materials, developing new health facilities and providing agricultural education for increasing farm yield. These services and benefits will be free so that all individuals within the community may benefit.

Jadora recognizes that the poorer households and villages are the ones most dependent on the resources of the forest, and so they will be impacted the most. At the same time, however, Jadora will address their educational, health, and economic needs first, so as to provide attractive and adoptable alternatives to forest degradation.

GL2.3 Demonstration of Neutral or Positive Impact on Vulnerable Households

There greatest risk preventing benefits from going to poorer households occurs when the benefits are given in the form of cash payments through the village chief system. Direct payments typically further the political projects and lifestyle of the chief. For this reason, Jadora provides benefits through transparent community-based projects that are planned and carried out jointly with the village households, addressing problems and solutions that the villagers identify through interactive general community meetings. Sub-groupings in the village, such as women's groups, the council of elders, youth groups, and different religious groups are also consulted independently.

GL2.4 Demonstration of Neutral or Positive Impact on Disadvantaged Groups

Many villagers within the project area live off what they can gather in the forest, including beetles, grubs, snakes, rodents, and for skilled hunters, deer and monkeys. The pressure on forest game is a byproduct of protein deficiency in a society that subsists largely on tubers, plantains, and grains. There is no potential within the Isangi project that those individuals that depend on the forest for their livelihood will be negatively impacted. The project does not aim to stop sustainable forest resource extraction. Instead, the program focuses on increasing agricultural yield to reduce deforestation from subsistence agriculture and on introducing tilapia farming to reduce hunting pressure. The project will not force people to stop cutting primary forest in the project area. The program instead works to provide benefits that encourage the adoption of new techniques (alternative methods for agriculture) and technologies (fuel efficient stoves) that reduce the need to cut primary forest.

GL2.5 Community Monitoring of Disadvantaged Groups

In addition to excellent relations with the village leadership and with the region's educational and health institutions, Jadora has developed a broad network of forest workers in the villages to work in carbon stock measurement, conservation and other forest jobs. These workers are familiar with their villages and able to inform Jadora on positive or negative impacts on poor or vulnerable groups. Interactive general community meetings will also allow the villagers to identify and address issues as they arise. Additionally, women's groups, the council of elders, youth groups and religious groups will be consulted to help monitor the social impacts of the project. Jadora's on-going dialogs, networks of consociates, and in-depth ethnographic field research serve to monitor any negative impacts on villagers, particularly on the poorest who might be inadvertently marginalized.

GL3 Exceptional Biodiversity Benefits

GL3.1 Vulnerability

Critically Endangered (CR) and Endangered (EN) Species

The Jadora-Isangi REDD project has historical evidence of Forest elephants (Figure 10). While there is no current evidence the forest elephants still exist the area is large enough that a remnant population may still exist deep within the project area. Protection of the project area will allow for future studies and possible reintroduction to the area.

Vulnerable Species (VU)

The project has a number of vulnerable species that have breeding populations within the project area, including:

- Leopards (*Panthera pardus):* Tracks have been observed. Additionally villages have killed leopards in the within the last 18 months (Figure 9).
- Dwarf crocodiles (*Osteolaemus tetraspus)*: in local bushmeat trade (Figure 19).
- Bay duiker (*Cephalophis dorsalis)*: in local bush meat trade.

- Yellow backed duiker (*Cephalophis silvicultor)* in local bushmeat trade.
- Sitatunga (*Tragelaphus speki*).

Figure 19 Dwarf crocodile (*Osteolamus tetraspis*).

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