ISANGI REDD+ VCS-CCB PROJECT DESCRIPTION

Document prepared by:

Project Name	Isangi REDD+ Project
Project Location	Isangi territory, Yangambi District, Orientale Province, Democratic Republic of the Congo
Project Proponent	Jadora, LLC. Contact: Donald Tuttle, CEO, +1 425 614-6191, don@jadorallc.com
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Project Start Date	01 – August – 2009
GHG accounting period and lifetime	Starting 01 – August – 2009 and ending 31 – July – 2039
Project Implementation Period and GHG Monitoring Period	August 1, 2009 – December 31, 2013
Validation	Seeking full validation
CCB Status History	Undergoing Initial Validation and Verification
CCB Standards Edition Used	Climate, Community and Biodiversity (CCB) Standards, Second Edition, December 2008
CCB Benefits Summary	The project seeks to address the issue of deforestation in the DRC on a local level, protecting the climate and biodiversity by maintaining and enhancing this tract of rainforest while enhancing the quality of life of the local communities through sustainable agriculture and economic development
Gold Level Criteria	Biodiversity – The project will protect endangered and vulnerable floral species through forest conservation.
Date of PD Completion	3/19/2014
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1 GENERAL

1.1 Summary Description of the Project (G3)

1.1.1 PROJECT DESCRIPTION

Tropical rainforests represent one of the largest reservoirs of both carbon and biodiversity on earth. Degradation and deforestation of these forests accounts for 10-15% of all emissions of greenhouse gases by humans. Carbon finance presents an economical way to reduce these emissions while preserving biodiversity resources and improving the lives of forest-dependent people. This document describes a plan to reduce emissions from mosaic deforestation within a tropical rainforest in the Isangi territory of the Democratic Republic of Congo (DRC).

Jadora, LLC (Jadora), the project proponent, has developed the Isangi REDD+ Project (the project) on a 348,000 ha logging concession leased by the DRC government to the Congolese company Safbois, S.P.R.L. A significant portion of this concession has been determined to be a prime area for a REDD+ project. The original Safbois concession consists of two sections, a large concession (252,000 ha) just south of the Congo River near the town of Isangi and a smaller, adjacent concession (96,000 ha) further to the south. Prior to the project start date, Safbois planned to log the forested parts of the concessions on a 30-year rotation.

The REDD+ project area contains one parcel of forest in the concession totaling 201,731.5 hectares. Active deforestation is occurring on three sides of the project area and inside the exterior boundaries of the project area. The coordinate centroid of the project area is 0^{o} 24' N, 23^{o} 55' E. The official name of the project is the Isangi REDD+ project.

In the "without project" scenario or baseline scenario, selective logging of the project area would be relatively low impact, as it would remove less than 3% of the carbon in the forest and does not result in deforestation detectable with large scale methods such as the interpretation of satellite imagery.

Although the direct emissions from logging are minimal, the subsequent emissions from forest clearing and agriculture are substantial. New logging roads invite settlement by farmers that practice shifting agriculture. Forest is cut, wood is harvested for building materials and cooking fuel, and the remainder is burned to supply mineral-laden ash to fertilize soil. Soils retain nutrients poorly because of heavy rainfall, and farmers must cut new forest every 3-5 years to sustain food productivity. With the population of the DRC growing at more than 3% per year (Perez et al. 2006) and expected to more than double by 2050, deforestation driven by shifting agriculture is likely to follow the trajectory of other logging concessions in the Congo and of tropical forest nations like Indonesia, Mexico, and Brazil (Brink and Eva 2009, Drigo et al. 2009, Diaz-Gallegos et al. 2010), where roads created for logging open up formerly impenetrable forests to exploitation for conversion to agricultural or pastoral land use. Continued logging operations create new roads, while improving and maintain existing roads over time. The creation, improvement and maintenance of roads lead to a compounding cascade of deforestation over time.

The Isangi REDD+ project will engage in two key activities to reduce emissions from deforestation:

1. Prevent the compounding cascade of deforestation by ceasing logging operations, with no shift in logging to other locales, to reduce emissions from forest clearing to agriculture.

2. Reduce area of forest cleared for agriculture by establishing sustainable agricultural practices that improve crop production and intensify agriculture on existing farm land.

These activities are expected to reduce deforestation rates by 89% (see section , leading to annual reductions in greenhouse gas emissions of 672,224 tons of CO_2e, annually.

The primary objective of the Jadora-Isangi REDD+ project is to address the issue of deforestation in the DRC 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 floral and faunal species as well as to improve the livelihoods of the area's forest-dependent people.

1.1.2 PROJECT OBJECTIVES

Jadora seeks to address the issue of deforestation in the DRC on a local level. This initiative will have positive climate, community and biodiversity impacts in the project zone.

The project reduces CO_2 emissions by preventing deforestation caused by land conversion of forests. The project prevents deforestation by addressing the drivers of deforestation in the project area through effective land-use planning and sustainable agricultural intensification. Jadora created the following climate, community, and biodiversity objectives through an analysis of the drivers of deforestation in the project area, the focal issues identified in consultation with communities and the participatory rural appraisal, and threats to biodiversity in the project zone. To achieve these objectives, the project proponent designed an array of project activities that fall under four program areas: education, improved production, improved access to resources, and land-use planning (see section 2.2 for details on project activities).

1.1.3 CLIMATE OBJECTIVES

- Reduce CO2 emissions that result from conversion of intact forest to agricultural land.

1.1.4 COMMUNITY OBJECTIVES

- Increase access to, relevance, and quality of education to communities in the project zone.
- Improve quality of life and alleviate poverty in project zone by promoting sustainable economic development and agricultural practices and improving public health.
- Maintain the value of resources and ecosystem services that are fundamental to the basic needs of communities in the project zone.
- Support communities in maintaining traditional, cultural, spiritual, and religious identities in the project zone.

1.1.5 BIODIVERSITY OBJECTIVES

- Maintain habitat for viable, abundant, and diverse natural populations.
- Reduce threats to rare, threatened, and endangered species.
- Maintain the function of the natural ecosystem.
- Increase local and global understanding of biodiversity in the project zone and Congo River Basin.

1.2 Project Location (G1 & G3)

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* S.P.R.L
Geographic location: Located in the central northeast of the DRC, the Isangi territory resides at the heart of the Congo River basin, and is specifically described as a triangular peneplain at the confluence of the Congo River and one of its midreach ordered rivers, the Lomami. Surrounding it on the remaining sides are upland and lowland tropical forests.

1.2.1 OWNERSHIP AND CONTROL

The land in the project area is government-owned and leased to Safbois S.P.R.L. as a logging concession. Safbois has given Jadora full uncontested control of the project area within this concession. This agreement can be viewed in the file entitled Annex AJ. The government of the DRC has granted the ownership of the carbon rights within the Safbois concession to Jadora. Please see Annex AK to reference the government's attestation of carbon rights in the project area to Jadora.

1.2.2 PROJECT'S GEOGRAPHIC BOUNDARIES

The project area consists of 201,731.5 hectares of intact primary and secondary 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 540 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 project zone includes 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. 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.

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 project area is a peneplanation surface arising approximately 435 meters above sea level at the city of Isangi while being over 1500 km up the Congo River.

1.2.3 PROJECT'S PHYSICAL PARAMETERS

1.2.3.1 Soil

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).

1.2.3.2 Geology

The basic geology of the area is Cretaceous and Cenozoic in origin with overlying continental deposits up to 1000 meters in thickness (during Cretaceous and Tertiary periods) followed by a long cycle of low subsidence. (Kadima et al 2011, Giresse 2005). Since that time there have been recent deposits associated glacial and interglacial episodes. In general, the project zone has no geologic activity such as volcanoes or earthquakes.

1.2.3.3 Climate

The climate type is AF in Koppen classification with an average rainfall of above 1,500 mm per year (Koppen 1936).

1.2.4 PROJECT ZONE

The project zone is defined as the union of the project area, the communities affected by the project, and leakage area surrounding the project area. The project zone is partially 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. Twenty-one villages, with a total population of approximately 150,000 people are located within the project zone.

1.2.4.1 Project Zone Map

Please see Annex I for a map of the project zone. The map shows the location of roads and villages in the project zone and includes the project and leakage area.

1.2.5 PROJECT AREA

Prior to the project start date, Safbois planned to log the project area 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.

The project area (total 201,731.5 hectares) contains multiple parcels of forest experiencing active deforestation on three sides and in a few interior areas. The project area does not include some areas with planned oil palm plantations or active logging as of the project start date. No logging will occur in the project area as of the project start date. Unlike the project zone, the project area does not contain any established villages. The coordinate centroid is 0o 24’ N, 23o 55’ E.

1.2.5.1 Project Area Map

Please see Annex J for a map of the project area.

1.2.5.2 Spatial Boundaries

The project area is bounded by a logging concession to the northwest. The project area is a combination of 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. The spatial boundaries of the project area extend into both of these concessions and exclude non-forest areas based on a 2009 benchmark map for the project start date (Annex N).

1.2.5.3 Multiple Parcels

Not applicable, the project consists of only one parcel.

1.2.5.4 Project Area and Reference Region

Section 5.3.1 describes the selection, delineation and justification of the reference region. Relative to the project area, the reference region is considerably larger. The size of the reference region is 4.174 million hectares to the east, west and north of the project area. The limits of the reference region include current and former logging concessions, exclude protected areas and are entirely within same Orientale province as the project area.

1.2.5.5 Digital Files

Digital files are provided for the project area (including discrete project area parcels), reference area, leakage area and project zone. Digital files for the project area are provided in KML vector and TIFF raster formats. Digital files for all other areas are provided in TIFF raster format. See the Table 1 for references to digital files.

Name	Reference(s)
Project Area	Annex AD, Annex AF
Reference Region	Annex AA
Leakage Area	Annex AB
Project Zone	Annex AC

Table 1. Digital files.

1.2.6 SURROUNDING AREA MAP

See Annex O for a map that includes the area surrounding the project zone.

1.3 Conditions Prior to Project Initiation (G1)

The project area including parts of the two forestry concessions at Isangi contain 281,900 hectares of forest of which 218,000 ha are currently operable. As a result of the creation, improvement and maintenance of roads during logging operations, the project area is susceptible to clearing from shifting agriculture.

Humans have inhabited this region of the Congo for thousands of years, yet, until the 20th century, the forest remained invulnerable to long-term transformation to other land uses. The FAO estimates the deforestation rate in the Democratic Republic of Congo to be 0.2% to 0.4% per year, but that rate is likely to increase if the current state of peace and economic recovery continues (Mpoyi et al. 2013). The DRC's population is currently growing at more than 3% per year and is expected to reach 140 million from the current 60 million by the year 2050 (CIA World Factbook 2013). The pressure to convert new lands to agriculture will increase unless better agricultural practices are instituted on currently farmed land so that these farms can meet the current and expected food needs of the population.

The wildlife in the forest is under intense pressure from bushmeat hunting, mostly for local consumption and exchange. The areas that have been opened up by logging are nearly devoid of species exploitable for food, such as primates, ungulates, and reptiles. Footpaths throughout the forest are lined with snares for small game. The people subsist on locally produced manioc, rice, bananas, corn, vegetables, and domestic chickens, ducks, goats, and pigs.

Incidence of common parasitic diseases including malaria and bilharzia are high, access to medical care is limited, and few students receive more than a grade school education. Thus, there are many opportunities to use revenues from emission reductions to make inexpensive but life-altering improvements for the people and wildlife.

1.3.1 ELIGIBILITY

The project has been generated for the sole purpose of reducing CO2 emissions from deforestation when compared to baseline levels.

1.3.2 VEGETATION

In the forest system, 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.

Prior to the project start date, there has been active logging of two species in the project area: Pericopsis elata (Afrormosia or African Teak) and Chlorophora sp. (Iroko). 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 both CITES and RED listed (Pericopsis elata) is known to occur within the project zone. Identification of lianas, herbs and epiphytes has not yet been possible.

The FAP Forest Resource Assessment from 2010 named the following floral species as the most widely distributed plants and trees in the DRC: Gilbertiodendron dewevrei, Uapaca guineensis, Scorodophloeus zenkeri, Annonidium mannii, Prioria oxyphylla, Petersianthus macrocarpus, Staudtia stipitata, Prioria balsamifera, Polyalthia suaveolens and Pterocarpus soyauxii (FAO 2010).

1.3.3 CARBON STOCKS

Current carbon stocks in the primary forest are intact but threatened by deforestation.

1.3.4 LAND USE

While uses within the project zone over the past ten years have featured some selective logging and conversion to plantations, most evidence of deforestation can be attributed to subsistence agriculture. Subsistence farmers gain entry to formerly isolated tracts of forest via road access created and maintained to transport timber. With this increased access, farmers cut down forest in order to provide land for annual crops. Because of the relatively poor nutrient quality in the region's top soils and the prevalent practice of shifting agriculture, soil health often degrades quickly over a period of a few seasons. Lacking the resources and agricultural techniques necessary to improve soil nutrients, farmers clear new forest when existing land becomes less productive.

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. Some forest clearing has occurred to establish paths and settlements, although these contribute less to the growing rate of deforestation in the region than subsistence agriculture.

1.3.5 PROPERTY RIGHTS

The land in the project area is owned by the government of Orientale Province of the DRC and is located within a logging concession leased to Safbois. On a national level, the basic land governance was framed by the 1967 Bakajika Law and the 1973 Land Tenure Law. The former restricted all forms of private land ownership, giving the State full ownership rights. The 1973 Law allowed for certain types of private concession, and also recognized that customary laws apply to user rights over non-allocated areas in

rural regions. Forest ownership and user rights are now subject to the 2002 Forest Code, which does not modify the 1973 Land Law by continuing to assert state ownership over all areas of forest, but it does broadly define certain categories of forest, such as those allocated for 'exploitation', 'community use' and 'conservation'. Please see section 3.1 for more information on laws governing land use in the project zone.

Under the 2002 code, Isangi's forests as a whole belong 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 developed. 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 leftover fields to the village youth, who traditionally don't have the authority to cut primary forest.

Village, clan and even family disputes are often due to non-compliance to land, forest and river limits. Collective chiefs and village elders (sages) are responsible for meeting together and solving the conflicts whether it is among individuals or entire villages. The party found culpable has to pay a sanction to the other party, usually in the form of pigs, palm wine or money equivalent. If a conflict is extremely disorderly, the leaders seek out the one who began the dispute and jail him for 30 to 45 days.

If a stranger wishes to obtain land in a village, he must speak directly with the chief of the village. The chief may distribute some land (if it is available) in exchange for payment or may direct the stranger to a family who is looking to allocate some of its land.

Unaccounted hunting in another's territory is equally conflicting. If one wishes to hunt in another village's primary forest, he must first meet with the chief and sages of the village. If permission is granted to hunt in their territory then the first animal hunted must be brought back and given to the leaders. This grants the hunter the blessing of the leaders and their permission to hunt as much as they would like within the village's forest territory.

1.3.6 COMMUNITIES

1.3.6.1 Types and Conditions

According to government statistics and Jadora's assessments, there are twenty-one villages in the project zone with a combined population of approximately 100,000 -150,000 inhabitants. According to the CIA World Factbook, 43.5% of the population of the DRC is aged 0-14 years while only 2.6% are 65 years or older. The database also states that the total fertility rate nationwide is 4.95 children born per woman while the infant mortality rate is 74.87 deaths per 1,000 live births. 66.8% of the population aged 15 and older can read and write in French, Lingala, Kingwana or Tshiluba (CIA World Factbook, 2013). The official website of the Orientale Province where Isangi is located states that the province has a population density of 16 people per squared kilometer (Oriental Province Official Website, accessed 2014).

The socioeconomic needs of the villages continue to expand due to its population growth, increased birthrate, the progressive introduction of technology, and the influence of surrounding regions—facilitated

by a large network of communication via waterways. The population's response to these growing needs is to increase agricultural production by opening new fields.

1.3.6.2 Culture

The majority of the local people trace their ancestry from an ancient immigration of Bantu-speaking groups from the east. Bantu heritage is a broad term used for the numerous ethnic groups in Africa who speak one or more of the many languages rooted from Bantu which is a lingual subset of the Niger-Congo languages family.

The project occurs 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. Due to greater income potential, almost every community expressed a preference for raising livestock over growing subsistence crops; though frequent disease outbreaks force communities to rely on agricultural practices.

Houses are built by hand with local materials from the forest. Only the thatching for the roof is purchased from a market. The quality of thatched roofing along with number of rooms in a house is a good indicator for wealth or stature and can be seen using satellite imagery. Houses with multiple rooms or additional free standing units (for each wife) denote greater wealth among a particular household.

The village chief often resides towards the center of the village and spends most of his time in the village pavilion where he receives visitors, speaks to the collective community and settles disputes with the aid of a group of elders, distinguished by their leopard skin pelts. Often located in the center of the village are an open dance/gathering place, a small multi-room schoolhouse and a health post.

While there are three major hospitals in the Isangi territory, almost every village has a small health post. Both systems are often poorly equipped, intermittently staffed and costly relative to local incomes. Fees for services and prescriptions must be paid in whole by each patient. This creates a basis for competition with the less expensive traditional healers although interviews with local villagers show that on average certain diseases are preferably treated by one or the other. Both the medical providers and traditional healers have somewhat of an understanding of which domain of illnesses they can and cannot treat.

Each village usually has a variety of churches of Christian denominations ranging from Catholic to varieties of Protestant to Pan-African.

Local and regional markets play a vital role in providing new economic alternatives and an understanding of how the economy beyond the village operates. Market surveys help to comprehend the relationship between household consumption, farmer productivity, and prices at different markets in the region while providing an insight into the variety of products available for sale at the markets. Products range from rice, bananas, cassava, corn, chickens, bush meat, soap, matches and artisanal commodities such as hand brooms, back baskets, chairs and more.

Outside of the market system, local people display success in other micro-economic projects such as metallurgy. Hidden throughout the brush which lines the paths are often small temporary stands selling specialty products such as metal kitchen utensils and pots created in home-made forges. This well-developed sense of entrepreneurship promotes the idea of microenterprise and microfinance in the area as a viable option for project investments.

1.3.6.3 Specific Groups

The overall population is made up of tribal village-based societies of general Bantu heritage, with high linguistic diversity and strong loyalties to its individual villages and linguistic groups.

Highlighted as their own specific group, Jadora has gathered together women of each local community. In the belief that community progress is truly possible when all members are contributing, Jadora makes a point to have separate community meetings with women's groups so that their perspectives on development needs and ideas for improvement can be freely expressed and clearly heard. Gender roles are distinctly outlined and adhered to by all in the community.

Although engaging directly with women as a cultural group is not traditional, many villages have become familiar with the idea as other non-governmental organizations have previously implemented these standards when working in the region. Women are very active contributors in the labors of village and field. As women are primarily responsible for raising children, they play a crucial role in passing on cultural values to younger generations. More often than not, women express ideas and concerns that are more practical and pragmatic than those expressed by the men. Likewise, they propose projects that involve women collectively more than as individuals. Usually women are enthusiastically active and participatory in expressing their needs and ideas about the community.

1.3.6.4 Characteristics

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

Labor

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. Women are paid by crop sharing, cloth or cash at a rate about 50% of what men are paid.

Land

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.

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.

The settlement pattern for most villages runs parallel alongside a pathway or river which is suggestive of migration routes as well as the inclination towards mobility in order to reach markets which shift location each day of the week.

Resources

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

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. 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 zone since March 2010. Throughout this period, Jadora has established dialogue with local villagers, local and international NGOs, and the territorial, provincial, and national governments (see section 2.7 for details on stakeholder engagement).

1.3.7 BIODIVERSITY

Diversity in Orientale Province:
There have been no previous studies of biodiversity within the project zone. 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 zone.

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 the Orientale province. They have released their preliminary data (See Annex A), 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 zone, the information they collected is directly relevant to the Jadora-Isangi REDD+ project.

To the west and southwest of the project zone 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 DRC and the presence of

Yangambi/INERA in the province, the complete flora of the project zone remains unknown due to lack of sufficient comprehensive studies.

Despite the lack of completed studies about this region, what has been uncovered about the area renders its floral diversity as extremely unique. For example, WWF cites Shumway et al 2003 saying "In the Democratic Republic of Congo (DRC) alone, 11,000 forest plant species have been described, of which over 1,100 of these are found nowhere else. About 69 species are threatened." When considering what has already been discovered under such limited study conditions, one can imagine that there are numerous other species in the area that have yet to be found and classified.

The Isangi 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 Department - 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 (*Pericopsis elata*) is listed as endangered on the IUCN's RED List and present in the project zone. Identification of lianas, herbs and epiphytes has not yet been possible.

Faunal Diversity:

Jadora has instituted a program to assess the faunal diversity within the project zone. The techniques used (See SOP for Faunal Diversity) are based on those used by the Conservation International Rapid Assessment Program (Conservation International 2011). Jadora's biodiversity teams are responsible for conducting faunal surveys, and team members have lived most of their lives hunting and tracking animals within the project zone. Their substantial skills have been supplemented by extensive discussions and training with Jadora's Biodiversity Director. These skills include animal identification and animal sign recognition such as prints, scat or evidence of eating, nesting and movement. Animal identification training has also been conducted by locally trained hunters and university trained biologists. The teams are proficient in using GPS units, trap cameras, and wildlife identification field guides.

Approximately 972 survey hours have been spent assessing the project zone using the transect methodology since 2009. The biodiversity teams have identified 85 species of animals, of which 17 are either listed on the IUCN RED list or by CITES (or both) within the project zone. Throughout the project zone, faunal species live in a naturally intact environment with few 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. Please see Annex AL for a list of faunal species identified in the project zone.

The primary threats to biodiversity are frontier deforestation from surrounding villages for subsistence agriculture and hunting for the bush meat trade. Drivers for hunting species that constitute bush meat are most likely protein or market-based. With little knowledge of or access to disease treatment for livestock, these protein sources are often limited. Hunting bushmeat is one of the only viable options left to fulfill dietary needs for communities.

Furthermore, interviews with local people have made clear the monetary advantage of selling bush meat at the market place over agricultural or artisanal products. Species that are hunted for bush meat (in order of decreasing market price) include wild boars and bush pigs, antelope species such as the bush duiker and a variety of monkeys.

1.3.7.1 High Conservation Values

The Congo River Basin is considered internationally to be a priority site for ecosystem conservation ((http://wwf.panda.org/what_we_do/where_we_work/, http://www.conservation.org/where/africa_madagascar/congo/Pages/overview.aspx, www.cbfp.org/docs/news/nov.../EDF-Preliminary%20Assessment.pdf, Mittermeier et al. 1998, Olson DM, Dinerstein E. 1998). The project zone is located within the Congo River Basin.

The project zone 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.

HCV designation of the project zone 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, satellite imagery, on the ground assessments by Jadora personnel, literature review, and available conservation databases.

The project area is over 201,731.5 hectares of contiguous intact primary forest landscape. Concessions and the project area can be found in Annex Y and Annex Z

Figure 1. Juvenile Leopard killed in December 2011 near Yaenge Yafeta.

Figure 2. Image of old forest elephant teeth found within the project area.

1.3.7.1.1 Globally, regionally, or nationally significant concentrations

Protected Areas

There are no officially protected areas within the project zone (see Annex O).

Threatened Species

The project proponent has identified 17 IUCN RED-listed or CITES listed faunal species living in the project zone. Some notable organisms that have been documented inside the project zone include *Osteolaemus tetraspis,* the Dwarf forest crocodile and *Psittacus erithacus*, the African grey parrot—both listed as vulnerable species by the IUCN. *Panthera pardus* (the African leopard) and *Lophocebus aterrimus* (black mangaby) are also present in the project zone and as IUCN designated near-threatened species are of high conservation priority. Please see Annex AM for a list of all faunal species identified in rapid surveys.

Though no living individuals have been observed in the project zone, there is evidence the project zone was once inhabited by forest elephants (*Loxodonta cyclotis*), and remnant individuals may still live within the forest. Information was obtained from the project zone from local hunters, actual animals that have been hunted and caught, and fossil evidence presented to Jadora personnel.

The project proponent has not completed a full floral diversity survey; however, a number of IUCN Red-listed endangered and vulnerable floral species were identified in the project area through the forest inventory.

Endangered floral species:

- Afromosia/African Teak (*Pericopsis elata)* – 37 individuals identified in forest inventory
- Tola/Tola-blanc (G*ossweilerodendron balsamiferum)* – 11 individuals identified in forest inventory
- Wenge (*Millettia laurentii)* – 1 individual identified in forest inventory
- Douka (*Tieghemella africana)* – 2 individuals identified in forest inventory

Vulnerable floral species:

- Bosse Clair/Scented Guarea (*Guarea cedrata)* – 21 individuals identified in forest inventory
- Bosse Fonce/Black Guarea (*Guarea thompsonii)* –144 individuals identified in forest inventory
- Dibetou/African Walnut (*Lovoa trichilioides)* – 3 individuals identified in forest inventory
- Doussie bipindensis (*Afzelia bipindensis)* – 2 individuals identified in forest inventory
- Kosipo/Cedar Kokoti (*Entandrophragma candollei)* – 8 individuals identified in forest inventory
- Sapele/Sapelli (*Entandrophragma cylindricu)* – 3 individuals identified in forest inventory
- Sipo/Sipo Mahogany/Utile (*Entandrophragma utile)* – 1 individuals identified in forest inventory
- Tiama (*Entandrophragma angolense)* – 5 individuals identified in forest inventory

By ceasing logging operations in the project area, the project proponent will protect these high conservation value species.

Endemic Species

The project area has not been designated a priority site for endemics or for maintaining significant temporal concentrations of species. 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.

Migrations and Breeding Grounds

The project zone contains important feeding and breeding grounds for populations of Panthera pardus (Leopards).

1.3.7.1.2 Landscape Level Biodiversity

All species within the landscape boundaries occur in their natural patterns, distributions, and abundances. The project area is a landscape composed of intact primary forest. Among the mosaic of landscape patchwork and the numerous species that thrive throughout them, it is clear that both landscape ecology and richness of biodiversity are highly dynamic and codependent. Because landscape level disturbances can affect biological distribution just as changes in biodiversity can affect ecosystem processes, it is important to recognize the need for multi-scale methods in addressing landscape level organization and management.

All organisms within this environment do not have any human induced boundaries affecting their distributions and natural patterns. The HCV area is critical to maintaining the priority landscape. The project area is very large (201,731.5 hectares and contains no plantations of exotic species).

1.3.7.1.3 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. 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.

1.3.7.1.4 Ecosystem Services

The project zone includes areas that provide 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 prevalent in this system.

1.3.7.1.5 Fundamental Community Needs

The entire project area is fundamental for the basic needs of local communities by providing protein sources, cultural and spiritual meaning, traditional medicines, and fuel materials as well as housing and construction materials. These needs are not readily available options outside of what the forest provides. These fundamental and qualifying attributes exist as food grown in the forest, bush meat, fuel wood, building wood as well as plants and herbs used for traditional healing.

1.3.7.1.6 Cultural Identity

The project zone includes areas that are critical for the traditional cultural identity of the communities that exist there. Each village system has areas that are designated as “sacred” areas that exist within the project area. The size and location of these spiritual and religious 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.

1.4 Project Proponent (G4)

Jadora LLC (Jadora) is a sustainable land and resource management company based in Kirkland, Washington, USA. Jadora is the project proponent and is solely responsible for all aspects of project design, implementation, and management. As discussed in section 3.2 below, Jadora has full right of use for all emissions reductions from the Isangi REDD+ Project.

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Email: don@jadorallc.com
Website: www.jadorallc.com

1.4.1 MULTIPLE PROJECT PROPONENTS

Not applicable. Jadora is the only project proponent.

1.5 Other Entities Involved in the Project (G4)

Jadora S.P.R.L. is Jadora LLC's Congolese subsidiary responsible for processing payroll and taxes on behalf of Jadora LLC in DRC.

Contact: Donald Tuttle, CEO
Address: No. 3155 Q. / Kingabwa - KINSHASA / DRC
Telephone: +1 425-614-6191
Email: don@jadorallc.com

Societe Africaine du Bois S.P.R.L. (Safbois) is a Congolese logging company that produces selectively logged, exotic hardwood timber and timber products. Safbois owns the timber rights to the project area and provides Jadora with in-country assistance. This assistance includes access to facilities and equipment at the in Yafunga, as well as transportation and other logistics inside the DRC. Jadora entered into an agreement with Safbois in August 2009 to be the sole project developer for the Isangi project in exchange for in-country (DRC) logistical support during the project's development and a revenue share of the sale of carbon credits resulting from the development of the project. This agreement grants Jadora all carbon rights associated with the project area.

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1.5.1 TECHNICAL SKILLS AND CAPACITY

The Jadora leadership team has extensive experience in community engagement, biodiversity assessment, and carbon measurement across Africa, Asia, Latin America and the Caribbean.

The organizational structure for the Isangi REDD+ Project and individual roles and responsibilities for each staff member are detailed in the Isangi Implementation Plan, REFERENCE. The Monitoring and Implementation Report provides a current list of Jadora staff members and their skills and experience.

For assistance in its public health initiatives, Jadora is partnering with the Emerging Pathogens Department at the University of Florida. Safbois has decades of on-the-ground management and operational experience in the DRC. Safbois manages in-country logistics for the project and plays a key role in recruitment activities to fill employment gaps in the DRC.

Please see the Annex P, Monitoring and Implementation Report, and section 8.1.1 for more details on the technical skills and Jadora staff responsibilities and experience.

1.5.2 REGULATORS

Compliance with VCS and CCB standards is regulated by a third party verification body. Rainforest Alliance is an accredited verification body for VCS and CCB and serves as the initial validator and verifier for the project.

1.5.3 GHG PROGRAMME ADMINISTRATORS

The VCS Association (VCSA) and the Climate, Community and Biodiversity Alliance (CCBA) are responsible for administering their respective programs. These responsibilities include maintaining

documents relevant to project design, implementation, and monitoring. CCBA posts a version of this document for public comment during validation as well as the Monitoring and Implementation Report when the project seeks verification. VCSA maintains a registry of projects including descriptions, monitoring results, and emissions reductions issued.

1.6 Project Start Date (G3)

The Project Start Date is August 1, 2009. This is the execution date of the agreement between Jadora and Safbois, leading to the cessation of logging in the project area. This is the first project activity implemented by the project proponent to address the drivers of deforestation in the project area and generate GHG emissions reductions.

1.7 Project Crediting Period (G3)

The Project Crediting Period will last for 30 years from the Project Start Date: August 1, 2009 – July 31, 2039.

1.7.1 PROJECT LIFETIME AND CHRONOLOGICAL PLAN

The Project Lifetime will span the duration of the Project Crediting Period, from August 1, 2009 – July 31, 2039. The project has been divided into four implementation phases:

- Phase 1: August 1, 2009 – December 31, 2013
- Phase 2: January 1, 2014 – December 31, 2018
- Phase 3: January 1, 2019 – December 31, 2023
- Phase 4: January 1, 2024 – July 31, 2039

The Isangi Implementation Plan outlines the activities to be implemented in each phase of the project over the course of the Project Lifetime. Jadora uses an adaptive management process (also detailed in the Implementation Plan) to adjust project implementation according to stakeholder input and results of project monitoring. Monitoring activities occur annually, and the results are presented in the Monitoring and Implementation Report when the project seeks verification and VCU issuance. Monitoring of land use change in the Project Area, and the leakage belt will be conducted biannually, combined with continuous ground assessments of deforestation by Jadora's forest monitoring teams. For more information on monitoring procedures, please see section 8.1.

The project takes place on two logging concessions leased to Safbois by the DRC National Government. The current leases for both concessions were issued to Safbois in 2009, for a period of 25 years. Safbois is eligible to renew the logging concession in 2034, covering the lifetime of the project (Annex Q).

1.7.2 IMPLEMENTATION SCHEDULE

The Implementation Plan includes the long-term implementation schedule for the project reference. Beginning in Phase 2, Jadora will create an Annual Operating Plan (AOP) to set priorities, budgets, and timelines for project activities implemented and continued throughout each year.

1.7.3 BASELINE REASSESSMENT

The project baseline will be reassessed at least every 10 years from the Project Start Date (2019 and 2029). Jadora expects to reassess the baseline more frequently due to anticipated acceleration in deforestation in the reference region.

1.7.4 ARR/IFM HARVESTING PERIODS

Not applicable. The project is not claiming emissions reductions from Afforestation, Reforestation and Revegetation (ARR) or Improved Forest Management (IFM) activities.

1.7.5 DIFFERENCES IN CREDITING PERIOD AND IMPLEMENTATION SCHEDULE

Not applicable. The crediting period and implementation schedule are the same.

2 DESIGN

2.1 Sectoral Scope and Project Type

The applicable VCS sectoral scope for the project is: 14 Agriculture, Forestry and Other Land Uses (AFOLU), under the Reduced Emissions from Deforestation and Degradation (REDD) project category. The project activities are designed to Avoid Unplanned Deforestation (AUD) occurring in a mosaic pattern. The project fits this category and activity type due to the distribution of the agents and drivers of deforestation identified in the baseline scenario detailed in section 4.5 below.

2.1.1 GROUPED PROJECT

Not applicable. This project is not a grouped project.

2.1.2 PROJECT ELIGIBILITY

The project complies with all rules and requirements stated in the following documents:

- Verified Carbon Standard (VCS) Version 3.4, October, 2013
- VCS Program Guide, Version 3.5, October, 2013
- VCS Agriculture, Forestry, and Other Land Use (AFOLU) Requirements, Version 3.4, October, 2013
- VCS Methodology VM0006 “Methodology for Carbon Accounting of Mosaic and Landscape-scale REDD Projects” Version 2.1, January, 2014
- Climate, Community, and Biodiversity Standard (CCB), Second Edition, December, 2008
- Rules for the Use of the CCB Standards, issued December, 2013
- ISO 14064-2:2006 “Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements”

The project proponent will adhere to all required changes made to these documents and their respective programs over the project lifetime and crediting period.

2.1.3 METHODOLOGY REQUIREMENTS

The project fully applies the VCS Methodology VM0006 version 2.1 “Methodology for Carbon Accounting of Mosaic and Landscape-scale REDD Projects.” The project employs all required tools and modules of the methodology. For information on the models used by the project proponent, see section 5.

2.1.4 PROJECT CONVERSIONS

As the project seeks to protect existing primary forest, the project proponent does not conduct any land conversion. The project does not use ARR, ALM, WRC, or ACoGS activities to create emissions reductions, so land has never been converted for the purposes of pursuing these activities. Moreover,

the project proponent has not drained any native ecosystems or degraded hydrological functions in the project area for the purpose creating emissions reductions. Historical LULC analysis of the project area provided in section 5 demonstrates that the project proponent has not converted any lands for the purpose of carbon credit generation.

2.1.5 JURISDICTIONAL REDD+

To date, there are no national or sub-national Jurisdictional Nested REDD (JNR) Programs in DRC or the Orientale Province. Thus, there are no JNR requirements for the project to follow. The project has been registered on the DRC National REDD Registry. The project proponent is supportive of these policies and will participate in their development.

2.1.6 GOOD PRACTICE AND GUIDANCE

The project proponent strives to use industry best practices in implementing the project. The project proponent uses the *Social and Biodiversity Impact Assessment Manual for REDD+ Projects* (Richards and Panfil, 2011) to measure social and biodiversity impacts of the project and the UN-REDD Programme *Guidelines on Free, Prior and Informed Consent* (Laughlin, 2013) as guidance on Free, Prior, and Informed Consent.

2.1.7 MULTIPLE PROJECT ACTIVITIES

Only one methodology has been applied to the project, and project activities are described below.

2.1.8 MULTIPLE INSTANCES OF PROJECT ACTIVITIES

Not applicable. The project does not contain multiple instances of project activities.

2.2 Description of the Project Activity (G3)

Jadora has designed a suite of project activities to address the focal issues identified through community consultation as well as the primary drivers of deforestation in the Project zone and Area, respectively. These activities are organized into four broad program areas: Education, Improved Access to Resources, Improved Production, and Land-Use Planning. These program areas are designed to demonstrate how the project creates long-term, positive climate, community and biodiversity impacts using a Theory of Change causal model, described in greater detail in the Isangi Theory of Change Document, Annex K.

The project proponent creates emissions reductions by reducing the forest area converted to agricultural use through agricultural intensification. These activities are also designed to achieve the project's community and biodiversity objectives. Jadora fully expects that the long-term implementation of these program areas, combined with effective monitoring and continuous engagement with local communities, will reduce deforestation in the Project Area and create positive biodiversity and community impacts in the project zone. A detailed list of project activities is included in the Isangi Implementation Plan (Annex B).

The project activities listed in the Implementation Plan can be driven internally by Jadora, externally by the communities in the project zone, or a combination of both. These categories are important because they dictate the activity's funding source. Internal project activities are funded exclusively by Jadora and reflect the priorities of the Leadership Team. External activities are identified by communities through the community benefits process outlined in the Annex C. These activities are funded by the portion of the carbon revenue set aside for the communities in the project zone. In many cases, activities are funded by both sources. For example, Jadora provides internal funding to demonstrate a new project activity, and

external funds are used to expand that activity in communities that request it through the community benefits process.

2.2.1 DESCRIPTION OF PROJECT TECHNOLOGIES

The project creates emissions reductions by reducing the amount of forest area that would be converted to agriculture under the baseline scenario. This is first accomplished by ceasing logging operations in the project area. While timber extraction itself is not a driver of deforestation in the project area, the roads built to access and remove logs facilitate agricultural expansion and forest conversion. By ceasing all logging in the project area, no new roads will be built and existing logging roads will not be maintained.

The project complements this activity with activities designed to reduce the need for new agricultural land. This is accomplished through encouraging improved agricultural practices that increase production on existing farm land.

2.2.2 PROJECT CLIMATE IMPACTS

The project will achieve its climate objective by reducing the area of forest converted for agricultural use. By increasing the productivity of existing agricultural land and creating land-use plans with villages in the project zone, Jadora works with communities to develop alternatives to forest conversion for agriculture. As mentioned in the previous section, an important activity implemented by the project proponent is the cessation of logging and the associated construction and maintenance of roads used to access primary forest for conversion.

Section 5.6.5 provides a table of estimated net-emissions reductions resulting from project activities. In order to create these positive climate impacts, the project relies on outputs and outcomes from project activities included in each of the program areas. Over time, the results of each project activity combine to create impacts as described in the Isangi Theory of Change Document, Annex K. For example, Figure 3 demonstrates how the four program areas work together to create positive climate impacts.

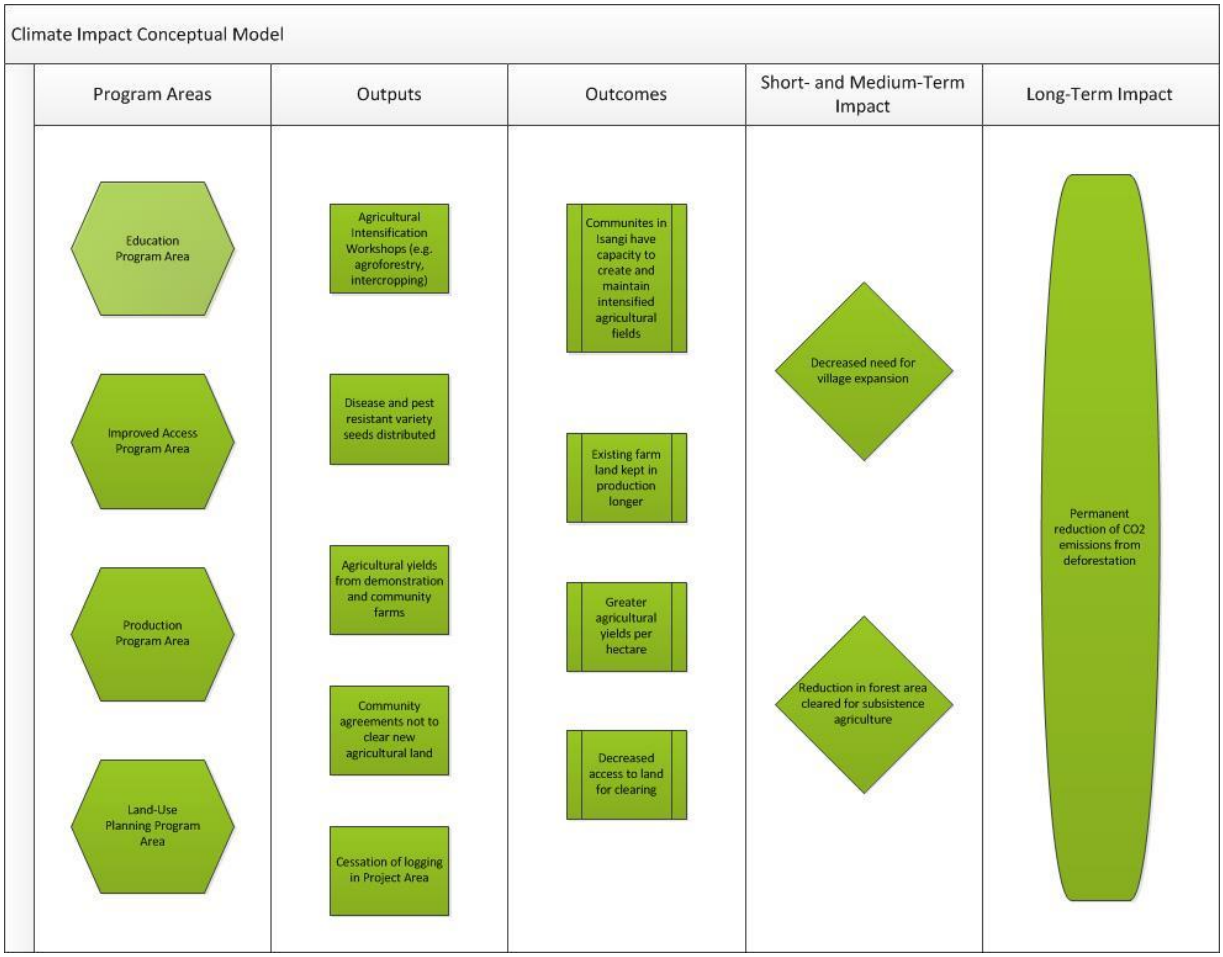

Figure 3. Climate impact conceptual model.

2.2.3 PROJECT ACTIVITY LIFETIME

As noted in section 1.7.1, the project is divided in to four phases for the purposes of implementation. The Isangi Implementation Plan included as Annex B indicates which project activities will occur in each phase.

2.2.4 COMMUNITY AND BIODIVERSITY IMPACTS

The project's four program areas are designed to create positive community and biodiversity impacts relative to the projected baseline scenario. Like climate impacts, community and biodiversity impacts are evident from cumulative outputs and outcomes from activities in each program area. The ways in which each program area contributes to the project objectives are described in the Isangi Theory of Change Document, Annex K. Expected community and biodiversity impacts are listed in detail in sections 6 and 7, respectively.

2.2.5 FUELWOOD GATHERING

As fuelwood gathering was not identified as a driver of deforestation in the reference region, the project proponent will not generate verified emissions reductions from cook stove activities.

2.2.6 WOODLOT/WOODLAND ESTABLISHMENT

Neither charcoal production nor fuelwood gather were identified as drivers of deforestation in the reference region. Thus, the project proponent will not generate verified emissions reductions from these activities. Jadora is working with communities to create woodlots for fuelwood in order to create an alternative to gathering fuelwood from the primary forest in the project area. No forest will be cut for the purpose of establishing these woodlots.

2.2.7 SUSTAINABLE EXTRACTION

Jadora seeks to maintain and enhance Non-Timber Forest Products (NTFPs), especially those that are of high conservation value to communities. If any project activities are developed to commercialize or further develop NTFP extraction over the course of the project, Jadora will work with communities to create a sustainable harvest plan for these resources.

2.2.8 SUSTAINABLE AGRICULTURE

The land-use planning program area is designed to assist communities in deciding where to conduct agricultural activities. All agricultural activities funded or developed by the project proponent will take place on existing agricultural land and be sited in accordance with local land-use plans.

2.2.9 ASSISTED NATURAL REGENERATION

Not applicable. The project will not generate verified emission reductions from assisted natural regeneration activities.

2.3 Management of Risks to Project Benefits (G3)

2.3.1 NATURAL AND HUMAN RISK

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

Political Instability

Over the last 50 years the DRC has been one of the least politically stable countries in the world. The most recent conflict, the Second Congo War, lasted from 1998-2003 and included several major conflicts in the Orientale Province. However, the country is emerging from these past conflicts, as 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. Furthermore, forest concessions have historically rarely been affected by conflict and are rarely subject to extra-legal third party takeover.

The DRC government submitted a Readiness Preparation Proposal to the UN-REDD Programme in July 2010 and an Emissions Reductions Program Idea Note to the World Bank's Forest Carbon Partnership Facility Carbon Fund in May 2013. Jadora is seeking cooperation and agreement with the Ministry of Environment, Nature Conservation and Tourism of the DRC, but 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

In the UNDP's most recent Human Development Report, the DRC ranks 186 out of 187 countries. Military and social unrest are at critical levels, particularly in eastern DRC 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 REDD+ 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.

Support from the community for the project is strong. Community engagement and consultation has been ongoing and will continue throughout the life of the project. These participatory methods allow for feedback from communities and allow adjustments to be made in the event that communities express concern over unequal distribution of benefits.

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 DRC (Isangi Logging Concessions No. 091 and No. 034). There is no current dispute over the status of the land.

Opportunity Cost

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. Jadora prioritizes transparency and cooperation with the Congolese government and international 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 Risks

The primary risk in the project area is from flooding and/or drought. Both occur naturally throughout the project zone 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.

Diseases and pests pose an additional risk to climate, community and biodiversity benefits by reducing food security. Agricultural intensification is an important project activity to reduce pressure on forest for conversion. Jadora mitigates this risk by encouraging diversification of crops and distributing disease resistant seeds. Developing sustainable tilapia farms is another project activity at risk to pest and disease. Jadora mitigates this risk by teaching tilapia farmers to keep the ponds clean and avoid overcrowding. Jadora is also pursuing a partnership with the Emerging Pathogens Institute to study and control human, plant, and animal diseases in the project zone.

2.3.2 NON-PERMANENCE RISK AND BUFFER POOL

The project proponent has applied the VCS Non-Permanence Risk Tool version 3.2 and calculated a risk rating of 20. The project proponent will deposit the required number of credits into the buffer pool upon issuance of credits. The completed calculation tool is available in Annex L.

Internal Risk	Level of Risk or Mitigation	Justification	Score
Project Management	Management team includes individuals with significant experience Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (eg, individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs.	Management team engaged technical consultant ecoPartners to lead AFOLU project design and implementation and carbon accounting and reporting. ecoPartners has successfully managed projects through validation, verification, and issuance of GHG credits.	-2
	Adaptive management plan in place	Adaptive management plan in place	-2
Total Project Management			-4
Financial Viability	Project cash flow breakeven point is less than 4 years from the current risk assessment	Project cash flow breakeven point is less than 4 years from the current risk assessment	0
	Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven.	Project has secured 40% to less than 80% of funding needed to cover the total cash out required before the project reaches breakeven.	1
	Project has available as callable financial resources at least 50% of total cash out before project reaches breakeven.	Project has available as callable financial resources at least 50% of total cash out before project reaches breakeven.	-2
Total Financial Viability			0
Opportunity Cost	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities; or where baseline activities are subsistence-driven, net positive community impacts are demonstrated	Most profitable alternative land use is expected to be comparable with project activities.	0
Total Opportunity Cost			0
Project	Without legal agreement or requirement to continue the	No legal agreement in place to	18

Longevity	management practice	continue management practice.	
Total Internal Risks			14

Table 2. Internal risk estimate.

External Risk	Level of Risk or Mitigation	Justification	Score
Land and resources tenure	Ownership and resource access/use rights are held by different entity(s) (eg, land is government owned and the project proponent holds a lease or concession)	Ownership and resource access/use rights are held by different entity	2
Total Land Tenure			2
Political Risk	Governance score of less than -0.79	Calculated Governance score for the DRC is -1.618	6
	Country implementing REDD+ Readiness or other activities such as: The country is receiving REDD+ Readiness funding from the FCPF, UN-REDD or other bilateral or multilateral donors The country is participating in the CCBA/CARE RREDD+ Social and Environmental Standards Initiative The jurisdiction in which the project is located is participating in the Governor's Climate and Forest Taskforce The country has and established national FSC or PEFC standards body The country has an established DNA under the CDM and has at least one registered CDM A/R project	The DRC has submitted a Readiness Preparation Proposal to the UN-REDD Programme in July 2010 and an Emissions Reductions Program Idea Note to the World Bank's Forest Carbon Partnership Facility Carbon Fund in May 2013	-2
Total Political			4

Total External Risk	6

Table 3. External risk estimate.

Natural Risks

- Fire: The project area is primarily composed of tropical rainforest and the risk of significant loss due to fire is deemed to be low. Anthropogenic fires have been observed in the area; however, project activities, such as forest monitoring and intensified agriculture, will mitigate the risk of human-caused fires.
- Pest and Disease Outbreak: Due to the project area's wet tropical climate and high biodiversity levels, the forests have low susceptibility to losses due to pest and disease.
- Extreme Weather: The primary risk in the project area is from flooding and/or drought. Both occur naturally throughout the project zone and life in the region has adapted to the natural cycles of flooding and drought. These disturbances pose a low risk to the project.
- Geological Risk: Although there is some tectonic activity in the region due to the proximity to the Great Rift Valley, the risk is deemed to be very low. Geologic events in the area are rare and historically not large enough to pose a risk to carbon stocks. There are no active volcanoes in the area that pose a risk to the project.

Natural Risk	Significance	Likelihood	Likelihood-Significance Score	Mitigation	Score
Fire	Insignificant	50-100 years	0	0.5	0
Pest and Disease	Insignificant	50-100 years	0	0.5	0
Extreme Weather	Insignificant	50-100 years	0	1	0
Geological events	No loss	Not applicable	0	1	0
Subtotal					0

Table 4. Natural risk estimate.

2.3.3 MANAGEMENT OF RISKS BEYOND PROJECT LIFETIME

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.

2.4 Measures to Maintain High Conservation Values (G3)

Analysis indicates that the Isangi REDD project area is a HCV Forest both biologically and for the local communities (Section 1.3.7). The project objectives specifically include the maintenance of HCV resources in the project zone. In line with the precautionary principle, the Congo River basin area has been inadequately scientifically studied across the region. Biodiversity and ecosystem HCVs will be maintained through the cessation of logging in the project area and a reduction in forest area converted to agricultural land. These measures prevent habitat fragmentation and disruption of floral and faunal distribution. Jadora is also implementing measures to better understand the biodiversity in the project zone (e.g. through faunal surveys and bushmeat market surveys) and activities designed to reduce hunting pressure on wildlife populations. For instance, Jadora implements project activities to provide alternative sources of protein to communities in the project zone through aquaculture (e.g. tilapia farming).

Community HCVs are maintained through similar measures. By preventing conversion of forest, the project is able to maintain community "spirit forests" that are vital to community cultural traditions in the project zone. The land-use planning program area also enables the project proponent and communities to protect sacred sites by avoiding these areas when siting project activities and other land uses. Jadora is actively seeking to identify new HCVs in the project zone and will develop activities to maintain or enhance new HCVS as information becomes available.

2.5 Project Financing (G3 & G4)

Jadora is committed to covering the operating costs of the project, including those for implementation 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. Estimates of net carbon revenues from the project are sufficient to cover the estimated costs related to project activities and monitoring. Estimates of project development costs are based on extensive experience in the field in the Isangi territory. External project activities (those driven by communities) are funded by a portion of the net carbon revenue in accordance with the community benefits process described in Annex C. A detailed financial plan has been provided to the validators as Annex E.

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 DRC. Its name is abbreviated in the DRC as an "S.P.R.L." which stands for "*Société Privéeà Responsabilité Limitée*." 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.

2.6 Employment Opportunities and Worker Safety (G4)

2.6.1 EMPLOYMENT TRAINING

The project is assessing already impacted land that can be designated for small-scale farming/ranching/aquaculture using new agricultural techniques. Through workshops, locals and

community members 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:

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

Jadora trains all new workers on their rights outlined by the Labor Code and on relevant occupational health and safety topics. Also, Jadora is instituting a basic safety and medical care program that will occur twice a year. The Worker's Training Handbook will be provided to staff members within 2 weeks of beginning employment.

Managers will ensure that additional training is provided to staff, where needed. Managers are provided the Manager's Training Handbook, which contains documents to train managers as well as documents to be used to train staff on specialized areas, such as safe driving techniques, first aid, and proper use of machinery. Jadora's management team will do proper use of tools/equipment training. The basic emergency medical training will be conducted by a local medical professional (paid for by Jadora).

Staff members are asked to document standard operating procedures or instructions of common activities. In the event of staff turnover, these documents will be used to train new workers.

2.6.2 EQUAL OPPORTUNITY FOR EMPLOYMENT

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 community members 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).

DRC 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

2.6.3 WORKER'S RIGHTS

Laws and regulations on the protection of rights in the DRC 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. Jadora trains all new workers on their rights outlined by the Labor Code within the Worker's Training Handbook.

The DRC 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 DRC 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."

Jadora will ensure that the Isangi REDD+ Project is in compliance with all existing and future laws and regulations regarding worker's rights.

2.6.4 WORKER SAFETY

The Isangi REDD+ Project encompasses a wide variety of activities and will employ a staff of local community members. Ensuring the health and safety of workers is of the upmost importance to the project. Following the methodology of the International Labor Office, risk is assessed for potential hazards associated with all project activities. The objective of risk assessment is to comprehensively evaluate potential workplace hazards and, based on the analysis, establish measures to control them. Risk assessments identify hazards, workers at risk, control measures, and implementation responsibilities. While it is impossible to completely remove all hazards, with risk assessed it is possible to create controls and measures to reduce risk.

These risk assessments, including mitigation measures and implementation responsibilities, are outlined in the Worker Safety Risk Analysis document. The Worker Safety Risk Analysis document and risk assessments are made available to all staff members. Staff members will be informed of potential hazards and trained on control measures at the time of employment. Specialized training is provided for workers in occupations associated with risks.

Risk assessments will be reviewed by the Project Manager on an annual basis, or at the event of a significant change in the workplace, to ensure that risk assessments are up to date and improvements are being made. Workers will be directly involved in evaluating and updating risk assessments. A binder of all current risk assessments will be kept at the office of the Project Manager and will be made available to any worker upon request. Blank risk assessment sheets will be kept to draft new assessments, when necessary.

2.7 Stakeholders (G3)

2.7.1 STAKEHOLDER ENGAGEMENT STRUCTURE

Stakeholders had direct involvement with the development of the PDD, and continue to provide input in project implementation. Stakeholders are identified and engaged by the Community Consultation Team, and the results from stakeholder involvement are presented to the Jadora Leadership Team. The Jadora Leadership Team and Isangi Project Manager are responsible for overseeing stakeholder involvement in the project and ensuring that stakeholder feedback is integrated into the project. Jadora engages stakeholders in initial design of the project, its implementation, and to gauge if the project has been effective in achieving its objectives. As noted in the Isangi Implementation Plan, Annex B, ongoing consultation and community monitoring feed directly in the adaptive management process for the project.

2.7.2 STAKEHOLDER IDENTIFICATION, INVOLVEMENT AND OUTCOMES

The Jadora Leadership Team identifies stakeholders based on who can provide valuable feedback or advice in conducting the project, and what groups of people will be affected by the project over its lifetime.

After identifying stakeholders, Jadora develops a strategy for engaging each stakeholder based on how Jadora expects these groups to participate. For example, the involvement process is much different for communities in the project zone than for government officials.

Communities in the Project Zone

Before developing the PD, Jadora first identified the project zone and the communities that could potentially be impacted by the project. The project proponent then set up a Community Consultation Team (CCT) to serve as an educational ambassador for the project. The team has visited the 21 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 communities. These meetings were announced by posting fliers at the houses of villages chiefs and local schools and churches, as well as on the local radio station. Meetings are conducted in Lingala, the dominant local language in the project zone.

To insure that an entire community (not just the chiefs) is involved with the project, understands its implications and has a voice in its development, Jadora holds different types of meetings in each village. Meeting types include just the village chiefs, the general populace, and women only meetings to insure each subset of a community are in an environment in which they feel free to discuss their ideas, opinions, and desires from the project. For each meeting, the CCT records the names of participants and a summary of the topics discussed.

These initial meetings allowed for Jadora to explain REDD and how the project works, as well as to provide communities with opportunities to ask questions, express concerns, and communicate needs or desired benefits. A list of desired benefits identified most commonly by communities is as follows:

- *Education:* The communities have expressed a desire to improve the infrastructure of the schools, provide materials for the students as well as set up adult education (especially for women).
- *Health Care:* The communities want new health facilities to be built and medicines provided.
- *Transportation:* The communities want the roads to be improved and new bridges built that will withstand the rise of rivers during the rainy season.
- *Community Centers:* Communities frequently stated the desire to have community centers for meetings and other community events.
- *Agricultural Assistance:* The communities indicated that they want assistance with agricultural practices including veterinary services for livestock and
- *Employment Opportunities:* Communities expressed a lack of employment opportunities in the project zone and want to see Jadora hire from within the community.

These discussions lead directly to the development of community focal issues and the project activities listed in the Isangi Implementation Plan developed to address them. Most communities expressed similar concerns during these initial meetings; these concerns are summarized below:

- *Lifestyle Change:* Communities expressed concern about the way the project will protect the forest and the activities that are being instituted. They questioned that if by protecting forest, the communities will still be able to continue to extract forest products as woods for cooking, trapping small animals to eat, or fishing.
- *Jadora's Relationship with Safbois:* Communities posed questions related to how Jadora will work with Safbois in conserving the forest. The project represents a change of course for Safbois from logging to forest conservation.
- *Community Benefits Distribution:* Communities frequently asked how benefits setup by cahiers de charge will be kept or redefined through the new project activities
- *Extent of Project and Participation:* There were questions about the geographical coverage of activities, the participation of local NGOs, the level of decisions makers (at clans or at big chiefs) they fear the politicization of the project (i.e. big chiefs taking/making decisions that do not assist/help the needs of the villagers)

Jadora addresses community concerns directly when they are expressed in meetings, as well as in the design or implementation of the project. For example, the community benefits process was influenced by the concerns of the communities over ensuring local participation in decision-making (see Annex C). Jadora has also made clear to communities that participation in the project is optional and the project

aims to maintain traditional lifestyles and identities. These commitments have been included as project objectives and are formally stated in the Isangi Policy Document (Annex F).

After the project design was completed, Jadora continued meetings with villages to solicit participation in the project. This process was implemented with the principles of Free, Prior and Informed Consent, discussed in greater detail in section 3.7.1 below. As villages and Jadora agree on the terms of references (cahiers de charge), Jadora continues to consult with communities on when, where, and how project activities will be implemented in their villages. To date, Jadora has signed agreements with twelve villages in the project zone, with more currently in negotiation.

Over the lifetime of the project, Jadora is committed to ensuring that communities play an active role in participating in the project. The Community Consultation Team conducts annual surveys on how the project affects individuals in the project zone and to solicit feedback from community members. Annex M provides a summary list of stakeholder meetings conducted to date.

In addition to communities within the project zone, Jadora has identified the following external stakeholders:

- Local government officials (Isangi administrateur du territoire) – Jadora has had numerous meetings with the AT since 2009. The Jadora Leadership Team meets with the AT periodically to provide project updates and encourages the AT to participate in community meetings.
- DRC Minister of Environment – Jadora has obtained approval from the Minister of the Environment and will continue to consult with the minister's office over the lifetime of the project to ensure that it is in compliance with national REDD policies.
- Yangambi Agricultural Research Center – The research center is located near the project zone. Jadora consults with researchers at Yangambi on implementation of agricultural intensification project activities and invites staff to demonstrate crop varietals in the project zone and conduct agricultural research in the project zone.
- Busira Palm Oil Plantation -- This palm oil plantation is located in the project zone. Jadora has met with management at the plantation regarding encroachment of palm oil in the project area. Busira uses a rotational system on its existing land and will not expand operations outside of its current area.

2.7.3 PUBLIC COMMENT PERIOD

This document will be posted to the CCBA website (http://www.climate-standards.org) and held open for public comment. The project proponent has also prepared a summary of this PDD and the accompanying Monitoring and Implementation Report in accordance with the *Rules for the Use of the CCB Standards* (December, 2013). These documents have been translated into Lingala, the language most prevalently spoken in the project zone, and posted on the CCBA website. French words are used to fill gaps in Lingala vocabulary in these summaries. In addition to communities in the project zone, Jadora has notified the Isangi Territory Administrator (administrateur du territoire) and the DRC Minister of the Environment.

The Community Consultation Team is also publicizing the comment period by visiting villages in the project zone and distributing copies of the summaries. 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 will assist them in uploading their comments. The generator providing electricity for the VSAT internet system is available from 17:00 to 21:00 daily. Community members can also submit written comments that will be scanned by the Community Consultation Team

and submitted to CCBA. The Project Proponent will address all comments received during the public comment period.

2.7.4 STAKEHOLDER CONFLICTS AND GRIEVANCES

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. Jadora's entire grievance process is included in Annex AO. There is a translated summary and poster outlining this process posted at Jadora's basecamp in Yafunga.

2.8 Commercially Sensitive Information

Documents pertaining to the commercial rights and financial information related to the project have been withheld from the public document but are provided to the project validators.

3 LEGAL STATUS

3.1 Compliance with Laws, Statues, Property Rights and Other Regulatory Frameworks (G4 & G5)

Jadora will comply with all applicable national, district, and local laws, statutes, and regulations. The government of DRC owns all of the land included in the project area and zone. This land is leased to Safbois as a logging concession, and Safbois has granted Jadora full legal rights to all carbon stored in the project area. A summary of Jadora's compliance with relevant laws is included here. A Congolese attorney has performed a thorough legal analysis and found Jadora to be in full compliance with all applicable laws. This legal opinion is available as Annex AH

Bakajika Law (Ordinance number 66-343, June 7, 1966)

This law restricts all forms of private land ownership, asserting to the State "full ownership rights over its domain and full sovereignty in conceding rights to land to up to 20 kilometers, forests and mines through the extent of its territory."

Land Tenure Law (Law number 73-021, July 20, 1973)

The Land Tenure Law allowed for certain types of 'permanent private concession', and also recognized that customary laws apply to user rights over 'non-allocated lands in rural areas'.

Forest Code (Law number 011/2002, August 29, 2002 and Decree number 11/27, May 20, 2011)

Forest ownership and user rights are now subject to the 2002 Forest Code, which sets out the basic 'framework' for the DRC Government's forest policy. The Code does not modify the 1973 Land Law, and continues to assert state ownership over all areas of forest, however, it also broadly defines certain categories of forest, such as for 'exploitation', 'community use' and 'conservation'.

Under the 2002 Forest Code, forestry concessions of up to 500,000 hectares can be granted, within which the operator has the right to exploit all timber. Concessions cannot be sold, rented or exchanged and these concessions' are subject to various stipulations which are detailed in the Code and implementation decrees. 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.

Ministerial Order number 033, October 2, 2006,

This order establishes the organization and operation of a national forest *cadastre*. Article 2 requires that the *cadastre* conserve a copy of the concession contract. Jadora has provided the provincial *cadastre* with two copies of the concession contract.

Interministerial Order numbers 006/CAB/MIN/ECN-EF/2007 and 004/CAB/MIN/FINANCES/2007, May 8, 2007

This order requires concession holders to pay annual taxes based on the area of forest leased. Safbois has paid all concessions fees and is in full compliance with the terms of the concession lease.

Forest Code and its related Ministerial Order number 024/CAB/MIN/ECN-T/15/JEB/08, August 7, 2008

This order establishes a public inquiry procedure when granting forest concessions.

Decree number 08/08, April 8, 2008

This decree establishes the procedure for classifying and declassifying forests. Article 17 states that an Environmental Impact Assessment is only necessary when decommissioning a forest, and therefore an Environmental Impact Assessment is not required for the Isangi REDD+ Project.

Ministerial Decree number 11/27, May 20, 2011

This decree outlines specific rules for the allocation of forest conservation concessions. Chapter III establishes the process of awarding forest concessions.

Ministerial Order number 004/CAB/MIN/ECN-T/012, February 15, 2012

This order establishes the accreditation procedure for REDD+ projects. Jadora has followed this procedure and will continue to follow this procedure through the life of the project. Jadora has submitted the Isangi REDD+ Project and been accepted by the national registry.

Law number 10/008, February 27, 2010

This law amended and supplemented the Decree of the King Sovereign of February 27, 1887 and the Decree of March 6, 1951. The law established the Commercial Register. Jadora is registered to the new commercial register.

Investments Code (Law number 004/2002, February 21, 2002)

The Investment Code outlines the legal structure for foreign investment in the DRC, which Jadora follows.

The Constitution of the Democratic Republic of the Congo, February 18, 2006 and amendments of Law number 11/002, January 20, 2011

The 2006 Constitution divides power between the central government and the provinces. Article 203 establishes forest rights to be the concurrent jurisdiction of the central government and the provinces.

Even though there has been legal precedent for developing concessions and monetizing carbon offsets generated from those concessions, stability around those terms and conditions were not necessarily established during this time period.

Thus, the Ministry of the Environment, Conservation of Nature, and Tourism (MECNT) has engaged in several activities and ratified several international conventions to ensure the transparent and sustainable of REDD projects with the Congo Basin, including developing and presenting a Readiness Preparation Plan to the UN-REDD Programme Policy Board in March 2010 and an Emissions Reductions Program Idea Note to the Forest Carbon Partnership Facility (FCPF) Participants Committee in May 2013.

Within these legal frameworks, there are several stakeholders that Jadora regularly interacts and cooperates with such as local and provincial officials, officials from the MECNT, representatives from the UN-REDD National REDD Committee, USAID, UNDP, and local Congolese NPO/NGOs. Jadora actively engages all stakeholders to provide input and feedback within the scope of the project and its design. Over the course of the nearly three (3) year engagement with various stakeholders, Jadora or Safbois have met with representatives of the UN-REDD National REDD Committee, USAID, and UNDP over 12 times and have been specifically asked to participate in the National REDD Committee's new REDD registry and provide strategic guidance on the development of the national REDD strategy. Jadora also directly engages with each of the 21 villages in the project area through outreach and communication programs, but more importantly by directly employing foresters from each village in the area.

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.

3.1.1 WORKER'S RIGHTS AND TREATIES

Jadora complies with all applicable local, district and national labor standards as well as regulations, standards, and methodologies associated with the development REDD activities. Laws and regulations on the protection of rights in the Democratic Republic of the Congo (DRC) are contained in Act 015-2002 of October 16th, 2002, establishing the Labor Code and its implementing measures and is the basic law covering labor issues in DRC. It contains regulations on contracts, professional training and education, rights and obligations of employers and employees, remuneration and forms of salary payment, the general work conditions, administration, the regulations on employment of minors, women and handicapped workers, leaves, and additional allowances such as the provision of meals and transport allowance. Chapter VII covers relevant regulations on health and safety standards at the workplace, and chapter XII the rights and regulations of collective bargaining and other professional relations.

The execution of this project in Isangi specifically invokes the Labor Code noted above and serves as a framework for how Jadora employees and interacts with our Congolese staff and provides recourse and procedures should Jadora need to terminate the contractual relationship with a worker. Jadora educates workers on their rights outlined in the Labor Code through training and the Worker Training Handbook.

The project will comply with the following national and local laws and regulations:

- **Forest Code** (Law number 011/2002) of 29 August, 2002 and related decrees concerning the procedure for allocating forest concessions.
- **Law number 73-021** of 20 July, 1973 and related decrees concerning general rules on property, land tenure, and real estate.

Jadora will ensure that the project is in compliance with all existing and future laws and regulations regarding worker's rights, the forest and environment, and REDD.

The Constitution of the Democratic Republic of the Congo of 2006 states 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." DRC is party to the following relevant treaties and international conventions:

- **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** – DRC has been a party to this convention since 1976
- **United Nations Convention on Biological Diversity** – DRC has been a party to this convention since 1994 and signed the Cartagena (2012) and Nagoya (2011) Protocols
- **United Nations Framework Convention on Climate Change** – DRC has been a party to this convention since 1995, as well as the UNFCCC's Kyoto Protocol since 2005
- **Treaty on the Conservation and Sustainable Management of Forest Ecosystems in Central Africa** – DRC signed this original treaty in 1999 and its agreement in 2005 to create the Central African Forests Commission (COMIFAC)
- **United Nations REDD Programme** – DRC is a partner country to the UN-REDD Programme and has participated in this process since 2010.
- **Tripartite Consultation (International Labour Standards) Convention** – DRC has been a party to this governance convention since June 2001.
- **Labour Inspection Convention** – DRC has been a party to this governance convention since April 1968.
- **Freedom of Association and Protection of the Right to Organise Convention, Abolition of Forced Labour Convention, Minimum Age Convention, Worst Forms of Child Labour Convention and Discrimination (Employment and Occupation) Convention** – DRC has been a party to these fundamental conventions since 2001.

The project objectives are directly in line with the goals of these treaties and conventions, and Jadora aims to help DRC in sustainably managing forest and biodiversity resources. Jadora plans to continue to participate in the development of DRC's national REDD program.

3.2 Evidence of Right of Use (G5)

Safbois and Jadora were granted the rights to develop the Isangi concession to commercialize and sell carbon credits resulting from the development of the property in a Letter du Attestation from The Ministry of the Environment, Nature Conservation and Tourism and the Minister of the Environment in 2010, signed by Jose E.B. Endundo (the Minister of the Environment in 2010). The Ministry agreed to provide complete support of the project, including the development sale of carbon credits, under several conditions:

1. Ensure appropriate reporting of project activities to the Ministry of the Environment, Nature Conservation and Tourism and registration of the project with the appropriate REDD registries,
2. Integrate with additional National activities and ensure National Coordination of REDD with Isangi activities, and
3. Ensure coordination with local activities including provincial efforts.

The original Letter du Attestation from the Ministry of the Environment is present in Annex AP. A Congolese attorney has performed a through legal analysis, and has found full legal evidence of right of use; this document is available as Annex AH.

3.2.1 EVIDENCE OF PROTECTING RIGHT OF USE

Village and forest boundaries are demarcated through participatory land-use planning described in section 2.2 above. These boundaries mark where villages have agreed to limit agricultural activities and protect existing primary forest. Jadora's Forest and Agriculture Teams monitor community agreements on land use as detailed in section 8.1 below.

3.3 Emissions Trading Programs and Other Binding Limits (CL1)

The emissions reductions and removals generated by the project will not be used for compliance with any emissions trading program or to meet any binding GHG emissions limit. To avoid double counting, emissions reductions will only be issued as Voluntary Credit Units (VCUs).

3.4 Participation Under Other GHG Programs (CL1)

The Isangi REDD+ project has not been, and will not be, seeking registration under any other GHG programs other than VCS and CCB. CCB verification will demonstrate positive climate, community and biodiversity impacts, but does not produce any registered emissions reductions or credits.

3.5 Other Forms of Environmental Credit (CL1)

The Isangi REDD+ project has not and does not intend to generate any related environmental credit for GHG emissions reductions or removals claimed under the VCS Program. As mentioned in Section 3.4, Jadora will pursue project validation and verification under the CCB Standard. No other forms of environmental credit will be sought by the project proponent.

3.6 Projects Rejected by Other GHG Programs (CL1)

The Isangi REDD+ project has not been submitted to any other GHG programs nor has it been rejected by any such programs.

3.7 Respect for Rights and No Involuntary Relocation (G5)

The project does not require or involve the involuntary relocation of people or of the activities important for their livelihoods or culture. Jadora does not seek to relocate communities or people in the project zone. Jadora's commitment to working with communities in the project zone and the policies that inform these practices are included in Jadora's Policy Document, Annex F.

3.7.1 FREE, PRIOR, AND INFORMED 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 DRC and occurs within a logging concession leased to Safbois.

Land use in the project zone is governed by village chiefs according to customary rights and laws. Jadora works with communities in the project zone to adopt land-use practices that do not rely on forest conversion for agricultural practices. Jadora's Community Consultation Teams are responsible for implementing the project's ongoing stakeholder consultation process described in section 2.7 above. This process was designed to allow communities to give free, prior, and informed consent in participating in the project in accordance with the UN-REDD Programme's *Guidelines on Free, Prior and Informed Consent* (2013).

The community consultation process first sought to provide foundational information on climate change, REDD, and the Isangi Project and how communities could participate and influence the project. In addition, the villages were able to discuss how the project may impact them, including benefits and potential risks, and Jadora has designed the project with input from the villages.

From these initial consultation meetings, villages were given time to freely decide if they wanted to participate in the project. For those interested in participating, terms of reference (cahier de charges) were drafted for each village and signed by Jadora and village leaders. Twelve villages have signed consent forms in the project zone, and Jadora is working to encourage the participation of the rest of the villages in the Project zone. Signed agreements are included in Annex GAnnex H.

Jadora acknowledges that giving consent is an ongoing process and continues to consult with communities on project developments. Villages can opt-out of project activities at any time. Jadora processes community input and feedback through the community impact monitoring procedures detailed in section 8.1.

3.8 Illegal Activities and Project Benefits (G5)

3.8.1 IDENTIFICATION OF ILLEGAL ACTIVITIES

There are few illegal activities that could affect the project's climate, community, and biodiversity impacts. Illegal logging poses a very low risk to climate benefits due to the lack of equipment necessary for extracting timber. Safbois has agreed to halt all legal, commercial logging in the project area. Although the Forest Code grants the concession holder all rights to forest use within the concession boundaries, it also permits agriculture and customary use by communities. Though technically not illegal, the overlap between use rights could have an effect on climate impacts in the project area through forest conversion.

3.8.2 PROJECT'S REDUCTION OF ILLEGAL ACTIVITIES

The project proponent implements participatory land-use planning activities with communities in the project zone to create agreements on forest use boundaries. By delineating boundaries and encouraging sustainable intensified agricultural practices, Jadora works with communities to limit forest conversion. The project proponent does not allow other land-use practices besides customary activities in the project area. The palm oil concession located within the concession has been removed from the project area.

3.8.3 DEMONSTRATE PROJECT'S LEGALITY

Within the project zone, none of the project activities violate any current law or regulation of any type. The project proponent is actively engaged and working with governmental and non-governmental stakeholders in the region and country, and will continue to proactively engage with any individual or group necessary for the successful completion of the project. The legal analysis presented in Annex AI attests to the project's sound legal standing.

4 APPLICATION OF METHODOLOGY

4.1 Title and Reference of Methodology

VCS Methodology VM0006, Version 2.1. *Methodology for Carbon Accounting for Mosaic and Landscape-scale REDD Projects*

4.2 Applicability of Methodology

Condition 1.

"Land in the project area, consists of either one contiguous area or multiple discrete project parcels (see definition of project area), and must meet an internationally accepted definition of forest, such as those based on UNFCCC host-country thresholds or FAO definitions, and must qualify as forest for a minimum of 10 years before the project start date."

The project proponent has obtained satellite imagery from ten years before the project start date to demonstrate that the land in the project area qualified as forest in accordance with the FAO definition of forest: "land spanning more than 0.5 ha with trees higher than 5 meters and canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use." (Global Forest Resources Assessment, 2010 http://www.fao.org/docrep/013/i1757e/i1757e.pdf). See section 5.3.2 for more information on historical LULC classification.

Condition 2:
"The project area must be deforested or degraded in absence of the REDD project activity and the deforestation and degradation must be mosaic in nature as described in the VCS *AFOLU Requirements* Drivers of deforestation and forest degradation must fall into one or more of the following categories:

- **Conversion of forest land to cropland for subsistence farming**
- **Conversion of forest land to settlements;**
- **Conversion of forest land to infrastructure, including new roads;**
- **Logging of timber for commercial sale (e.g., wood planks or poles for commercial sale);**
- **Logging of timber for local enterprises and domestic uses;**
- **Wood collection for commercial sale of fuelwood and charcoal;**
- **Fuelwood collection for domestic and local industrial energy needs (eg, cooking, home heating, tobacco curing, brick making);**
- **Cattle grazing in forests;**
- **Extraction of understory vegetation (eg, thatch grass collection for roof and livestock bedding materials, shrubs and small trees for straw fences);**
- **Forest fires to the extent that they are not part of natural ecosystem dynamics (eg, forest fires related to hunting, honey collection, intentional land clearing on land with a high fuel-load).**

None of the drivers listed above must be planned in nature. If deforestation from a specific driver is occurring as a result of planned forest conversion activities, then such a driver must be excluded from analysis."

The primary drivers of deforestation in the baseline are conversion to agriculture, using infrastructure from commercial logging. Deforestation and forest degradation in the project area occurs due to one or more of the following categories of drivers:

- Driver 1: Conversion of forest-land to crop-land or grazing land for subsistence and small-scale farming.
- Driver 2: Conversion of forest land to settlements
- Driver 3: Logging of timber for commercial sale
- Driver 4: Logging of timber for local and domestic use
- Driver 5: Fuel-wood collection or charcoal production

- Driver 6: Forest fires

The primary drivers of deforestation in the project area are drivers 1, 2, 4 and 5. The vast majority of deforestation and emissions is driven by conversion of forest-land to crop-land and grazing land for subsistence and small-scale farming or conversion to settlements. Degradation is driven mainly by driver 1. Forest fires have not been recorded in the region, as the baseline forest is permanently moist mature tropical rainforest (Krawchuk et al. 2009).

The only feasible future scenario in the absence of the project is continuation of the pre-project land use as logging concession. The project proponent Safbois 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 historical 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.

Condition 3.

"If deforestation from a specific driver is occurring as a result of planned forest conversion activities, then such a driver must be excluded from analysis."

The primary driver of deforestation is conversion of forest-land to crop-land or grazing land for subsistence and small-scale farming.

1. Assessing the relative importance of the drivers of deforestation and forest degradation.

Degradation

Commercial logging. Virtually all commercial logging in this region of the DRC is selective logging for relatively few (< 40) species, and the techniques for removing these trees (Edwards et al. 2010) 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 (240 tons/ha).

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.

2. 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 3.1.10. The analysis produces a logistic model of the probability of conversion of classified forest to non-forest between 1999-2010 as a function 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 (Perez 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.

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 DRC, 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 village.

Degradation Future degradation will likely become a negligible contribution to GHG emissions in the project zone, as Safbois S.P.R.L, 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.

Condition 4.

"Accurate data on past LULC and forest cover in the reference region must be available for at least three points in time, with at least one remote sensing image (i.e., data) from 0-3 years before the project start date, at least one image from 4-9 years before the project start date, and at least one image from 10-15 years before the project start date. No images older than 15 years can be used for the historical reference period"

The project meets the requirement as demonstrated in section 5.3.2.1.

Condition 5:

"The classification accuracy of LULC and forest cover maps must be greater than 70%. Emission reductions and/or removals from avoided forest degradation can only be included if the accuracy of determining forest strata is at least 70%."

The classification accuracy of LULC maps and forest cover maps is estimated to be 96%. Per section 4.3, forest strata are not included. Per section 5.3.3, degradation is not included.

Condition 6:

"This methodology is not applicable to organic soils or peatland.

No organic soils or peatlands are included in the project boundary.

Condition 7:

"This methodology is applicable to projects that implement one or more of the following activities:

- **Strengthening of land-tenure status and forest governance. Supporting the development and implementation of sustainable forest and land use management plans**
- **Demarcating forest, tenure and ownership boundaries; promoting forest protection through patrolling of forests and forest boundaries; promoting social inclusion and stewardship in local communities; facilitating social fencing through capacity building; and creating mechanisms to alert law enforcement authorities of forest trespassing.**
- **Fire prevention and suppression activities including the construction of fire breaks, reduction of fuel loads, prescribed burning, education to minimize intentionally started fires, support for fire brigades, water cisterns, fire lookouts, and communication systems.**
- **Reducing fuelwood consumption and/or increasing energy efficiency by introducing fuel-efficient woodstoves or brick kilns and curing equipment.**
- **Creation of alternative sources of fuelwood through agroforestry, farm woodlots management and introduction/intensification of other renewable and non-fossil fuel based energy sources (such as solar).**
- **Sustainable intensification of agriculture on existing agricultural land.**
- **Development of local enterprises based on sustainably harvested non-timber forest products (NTFPs) such as honey, medicinal plants, etc."**

The eligible project activities implemented as part of the project are:

- Strengthening of land-tenure status and forest governance. Supporting the development and implementation of sustainable forest and land use management plans
- Sustainable intensification of agriculture on existing agricultural land.

Optional Activities: There are no activities categorized as optional by the methodology included in the methodology.

4.3 Methodology Deviations

The project proponent requests one methodology deviation, as described below.

First Deviation	
Source:	VM0006 v2.1 Section 8.1.2.2
Criteria and Procedures:	To achieve the goal of defining classes that are homogeneous in carbon stock density, the forest LULC class must be sub-divided into forest strata. Forest land is usually heterogeneous in terms of local climate, soil condition, forest canopy cover, and forest type. Forest stratification can help define homogeneous units with reduced variance in terms of carbon stock density, and

	thereby increase the measurement precision without increasing cost, or reduce the measurement cost without reducing precision.
Relation to Monitoring or Measurement:	This procedure is related to both monitoring and measurement. To monitor carbon stock density over time, stratification can be used to improve the precision of carbon estimates. To measure carbon stock density over time, stratification can be used to improve the precision of carbon estimates.
Requested Deviation:	Forest LULC classes are not required to be sub-divided into forest strata.
Justification:	In many cases, forests are relatively homogenous at a landscape level. Not all forest inventories are stratified. This deviation is justified for two reasons. First, no consistent spectral signatures for different forest types could be identified between satellite images. Arbitrarily selecting spectral signatures leads to drastic and inconsistent strata between satellite images, even those images with the same coverage area, from year-to-year. Second, the precision of carbon stock estimates is quantified as uncertainty and accounted for in emissions factors in sections 8.1.4.4 and 8.1.4.5. Forgoing stratification may lead to less precise estimates, but the emissions factors are adjusted for the loss in precision in estimates relative to a stratified inventory.
Quantification Impact:	Because the uncertainty of carbon stock estimates is conservatively accounted for in the emissions factors and the introduction of inconsistent stratification between images creates new uncertainty, the impact on GHG emissions reductions and removals is conservative.

Table 5. Methodology deviations.

4.4 Project Boundary (G1)

Carbon Pool	Included?	Justification/ Explanation of Choice
Aboveground tree biomass	Yes	Major carbon pool affected by project activities, included as AGL.
Aboveground non-tree biomass	No	Baseline land cover is annual crop or pasture grass.
Belowground biomass	Yes	Major carbon pool affected by project activities, included as BG.
Dead wood	No	No, conservatively excluded from the project.
Litter	No	Excluded as per VCS AFOLU requirements.
Soil organic carbon	Yes	Major carbon pool affected by project activities, included as SOM.
Wood products	Yes	Major carbon pool affected by project activities relative to the baseline scenario.

Table 6. Selected carbon pools

4.4.1 DE MINIMIS

Source		Gas	Included?	Justification/Explanation
Baseline	Baseline Deforestation and Forest Degradation	CO2	Yes	Emissions are included in the changes of carbon pools.
		CH_4	No	Not required for REDD projects per the VCS AFOLU requirements.
		N_2O	No	Not required for REDD projects per the VCS AFOLU requirements.
Project	Cookstove and Fuel Efficiency (CFE) activities	CO_2	No	CFE activities are not implemented.
		CH_4	No	CFE activities are not implemented.
		N_2O	No	CFE activities are not implemented.
	Biomass burning from unplanned large and small scale fires	CO_2	Yes	Emissions are included in the changes of carbon pools.
		CH_4	No	CH_4 emissions of burning woody biomass from unplanned fires are insignificant. If the fires are catastrophic, CH_4 emissions must be estimated and demonstrated negligible or otherwise accounted for.
		N_2O	No	N_2O emissions of burning woody biomass from unplanned fires are insignificant, unless fires are catastrophic, N_2O emissions must be estimated and demonstrated negligible, or otherwise accounted for.
	Fossil fuel used during harvesting	CO_2	No	Harvesting is not an included project activity
		CH_4	No	Harvesting is not an included project activity
		N_2O	No	Harvesting is not an included project activity
	Removal of woody	CO_2	No	Fire prevention and suppression is not an included

	biomass for fire prevention and suppression activities			activity.
		CH_4	No	Fire prevention and suppression is not an included activity
		N_2O	No	Fire prevention and suppression is not an included activity.
	Removal of woody biomass during assisted natural regeneration (ANR) activities	CO_2	No	ANR is not an included activity
		CH_4	No	ANR is not an included activity
		N_2O	No	ANR is not an included activity
	Fertilizer used during enrichment planting for assisting natural regeneration	CO_2	No	ANR is not an included activity
		CH_4	No	ANR is not an included activity
		N_2O	No	ANR is not an included activity
	Increased area of rice production systems	CO_2	No	Rice production is not an included activity
		CH_4	No	Rice production is not an included activity
		N_2O	No	Rice production is not an included activity
	Increased fertilizer use	CO_2	No	Not applicable
		CH_4	No	Not applicable
		N_2O	No	N_2O emissions related to increased fertilizer use are de minimis
	Increased livestock stocking rates	CO_2	No	Not an included activity
		CH_4	No	Not an included activity
		N_2O	No	Not an included activity

Table 7. Emissions sources

4.4.2 SPATIAL BOUNDARIES

The Isangi project area boundary was delineated based on several criteria including property rights, project activities, and land cover. The project area is entirely forested as of the project start date.

The project area boundaries are derived as a single parcel of intact forest that resides in the project area limits. The project area limits are defined using a combination of spatial data including government shapefiles of the Safbois concessions, maps of concessions boundaries, maps of harvest blocks, digitized shapefiles of oil palm plantations inside the concessions, and digitized shapefiles of other plantations in the concessions. The map provided in Annex J shows the project area limits.

The project area limits exclude certain features, oil palm plantations and other plantations which are effectively protected and could be construed as planned land use conversions (see Annex AG). These features were digitized from high-resolution GeoEye imagery. After the project start date, some selective logging was performed by Safbois inside the concession but outside the project area limits and outside the project area. Harvest blocks where selective logging took place include numbers 18, 20 and 23. These harvest blocks are shown in Annex R and were digitized from Safbois maps.

The concession boundaries were obtained from government shapefiles, though shapefile boundaries in the southwest corner of the concessions were incorrect. Using maps of concession boundaries provided by Safbois, the boundaries in the southwest corners were corrected. Although the carbon rights in the entire Safbois concessions have been legally conveyed to Jadora, only a subset of the concessions is used to define the project area limits because implementation capacity is limited. The corrected concession boundaries, boundaries imposed by limits on capacity and the excluded features define the project area limits.

Results from the benchmark LULC classification are used to ensure that all non-forest areas within the project area limits are excluded from the project area boundary. The defined boundaries of the project area can be found in the Annex J.

4.5 Baseline Scenario (G2)

Generally, the baseline scenario is the conversion of forest to cropland driven by the expansion, improvement and maintenance of roads in the project area, which was taking place within the project zone immediately before the project start date. Forest clearing for agriculture provides the greatest economic benefit for individual farmers and their families who are the agents of deforestation. The primary drivers of conversion are the expansion of subsistence agriculture, driven by extensive agriculture and population growth, and enabled by improved access to the forest interior via logging roads. This is evident as it has been carried out routinely throughout the Reference and Project zones (see Annex AQ for a map of the Reference Area, and Annex J for a map of the Project Area). Alternative land uses in the region include oil palm plantations and extensive logging. These land uses are precluded by the distance of the project area from the Congo River (> 50 kilometers over poor roads) (Pérez et al., 2006). Conservation by the owner of the logging concession, Safbois, would be uneconomic; Safbois has not attempted to slow the conversion of forest to subsistence crop or plantation agriculture to date because the cost of forest protection would exceed logging revenues. Forest protection is thus not economically viable without carbon funding.

4.5.1 CLIMATE SCENARIO

Criteria and procedures for identifying and assessing potential baseline scenarios are outlined in the methodology and the CCB Project Design Standard. The methodology assumes that the most likely baseline scenario is the existing or historical changes in the carbon stocks in the project boundary. The developed scenario for each aspect of the baseline is described and defended in sections 4.5.1, 4.5.2, and 4.5.3.

An identification, analysis and selection between multiple competing baseline scenarios is presented in section 4.6, Additionality.

4.5.1.1 Drivers

The principal driver of future deforestation in the project zone is subsistence agriculture, with the rate of deforestation likely driven by increasing population pressure in the region due to high birth rates and immigration. This type of swidden agriculture might be better characterized as a ‘frontier’ type of agriculture, in which lands are cleared, those who originally cleared the land move deeper into the interior when the land will no longer support the type of agriculture they practice (Foster, 1981). Swidden agriculture, because of the nature of its shifting cultivation, is quite extensive and equates to a relatively large area of land cultivated for each family unit (Kotto-Same & Woomer, 1997).

Social surveys reveal that children comprise at least 50% of the human population in the project zone, and approximately 46% of the country's population as of 2010 (United Nations, 2011). Movement of people into the region has occurred in the past five years following the cessation of civil war in the DRC, and is already reflected in the rapid increase in deforestation rates between 1999-2002 and 2009-2010 (see section G2.3). People in the region generally lack reliable protein sources other than bushmeat from hunting animals in the forest, and again, a growing human population renders such hunting unsustainable. Consequently, the forest has served traditionally as fertilizer, fuel and protein source. Because the Isangi territory essentially has virtually no other large scale industries other than farming and charcoal, the demand for newly cleared land for the 300,000 to 500,000 people living the project area and leakage belt is intense and increasing. Families typically have so few possessions that they can easily travel 20-30 km/day on foot, and certainly farther on motorcycles. With the increase in political stability in the region, the mobility of farmers and their products has increased. They are able to go deeper into forests, feel more comfortable establishing larger farm plots and are able to get their products to market with little hindrance.

The project area contains 21 villages. An additional 20 villages are within one day's walk (20 km) of the center of the project area. The project area consequently is well within the sphere of influence of more than 10,000 people.

4.5.1.2 Agents

The main agents of deforestation are subsistence farmers. Impacts on climate in the baseline scenario are continued clearing of forest for subsistence agriculture as a result of road construction and maintenance. This scenario is evident in the reference region, which contains a proliferate network of roads in both current and former logging concessions; a similar network of roads would be necessary for Safbois to expand logging operations over time in the baseline (see Annex J). Relying on the road network, forest clearing for cropland provides the greatest economic benefit to individual farmers and their families, while selective logging, also relying on the road network, is the most profitable option for Safbois. As a result of selective logging and the transportation of logs to yards, roads are maintained and improved over time.

4.5.1.3 LULC Classes and Forest Strata

The analysis of LULC classes and forest strata is described in the Annex AR, and the Annex AS. The six IPCC LULC classes consisting of forest land, crop land, grassland, wetlands, settlements, and other land were considered in the LULC analysis of the project area, reference region, and leakage area (see Table 8). In addition to the six IPCC classes, a seventh class for water is also used. Of the seven LULC classes that are considered, the only classes present within the analysis areas are forest land, cropland, settlements, and water. Descriptions of the LULC classes and strata considered in the project area, leakage area, and reference region are shown in 5.3.2.3, and maps of the LULC classes include (Annex S,Annex T, Annex U).

The land cover within the project and reference area regions consists predominantly of dense tropical forest that meets the FAO definition of forest. The FAO defines forest as: "Land with tree crown cover (or equivalent stocking level) of more than 10 percent and area of more than 0.5 hectares. The trees should be able to reach a minimum height of 5 meters at maturity *in situ*."[1] The stratification of this forest was

[1] FAO definition of forest: http://www.fao.org/docrep/006/ad665e/ad665e06.htm

attempted during the classification process, described in the Annex AR, but there was no clear distinction between different forest strata. See section 1.1 for the requested methodology deviation for forest stratification.

Class	Type	Description
Forest	LULC	Meets the selected definition of forest, mostly intact primary or secondary forest
Cropland	LULC	Does not meet the definition of forest, active or recent agricultural production
Settlement	LULC	Does not meet the definition of forest, roads, home sites, buildings, burned areas and general domestic use
Grassland	LULC	Does not meet the definition of forest, historically grassland or savannah based on FACET classification
Wetland	LULC	Does not meet the definition of forest, seasonally inundated depressions
Water	LULC	Rivers, lakes and streams
Other Land	LULC	Bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other six categories

Table 8. End LULC classes

4.5.1.4 Probable Transitions

The probable transitions between LULC classes within the project and leakage areas shown in Table 9, are based off of the LULC Transition Matrix found in the Annex AT document. A table of probable forest strata transitions is not included due to the fact that multiple forest strata were not identified.

LULC Transition	Justification of LULC Transition
Cropland to Forest	Cropland to forest implies rapid regeneration to secondary forest.
Cropland to Settlement	Cropland to settlement implies the development of houses, roads and other infrastructure on land that had already been cleared for agricultural purposes
Cropland to Water	Cropland to water suggests the seasonal inundation of areas normally under cultivation, or the meandering of rivers over time
Forest to Cropland	Forest to cropland implies clearing of primary forest for agriculture
Forest to Settlement	Forest to settlement implies the rapid clearing of forest for the construction of housing, roads and other

	infrastructure
Forest to Water	Forest to water suggests the seasonal inundation of forested areas near water bodies, or the meandering of rivers over time
Settlement to Cropland	Settlement to cropland suggests that unused roads have been converted to cropland
Settlement to Water	Settlement to water suggests the seasonal inundation of settlements near water bodies, or the meandering of rivers over time
Water to Cropland	Water to cropland implies the meandering course of rivers over time, allowing the cultivation of crops in areas that were previously inundated
Water to Forest	Water to forest suggests the meandering course of rivers over time, allowing previous areas covered by water to allow the growth of vegetation
Water to Settlement	Water to cropland implies the meandering course of rivers over time, allowing the development of settlements in areas that were previously inundated

Table 9. Probable LULC transitions

4.5.2 COMMUNITY SCENARIO

Continued reliance on conversion of primary forest to cropland would lead to large-scale degradation of soils in cleared areas. Farming reduces mineral nutrients, which are most readily used by crops in 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 (Brady, 1996). After the second cycle, soils are often too poor to support regeneration of primary forest species without assistance (Kotto-Same & Woomer, 1997). This shortened fallow period also reduces the effectiveness of weed suppression, a primary goal of swidden agriculture (Rouw, 1995). This soil degradation forces further conversion of primary forest and an expansion of degraded lands. While in the past the forest would be allowed to regenerate, shortened fallow periods due to population pressure would have led to forest degradation and a continued 'frontier' configuration to forest clearing and communities in the forest area (Foster, 1981; Fox, Truong, & Rambo, 2000). Economically, local communities in the project area would derive some benefit from the intermediate production of charcoal during the clearing process, limited production for local market sale and employment with Safbois.

Swidden agriculture is generally associated with lower incomes and standards of health and education (van Vliet et al., 2012). Indeed, this is the case in the project area. Although approximately 80 persons were seasonally employed by Safbois in their logging operation, this dwarfs the population of the area: 150,000 persons. Safbois had also constructed a school for community use, but the government had not allocated the funds for teacher's salaries. Lack of veterinary services in the baseline would and did make animal husbandry difficult, and community members would continue to be reliant on bushmeat for much of their protein. As that resource is exhausted and community members move deeper into the forest to clear new fields and be closer to prey, increased distance is placed between them and any infrastructure.

Reliance on bushmeat thus would have serious deleterious effects on the communities as it is exhausted (Milner-Gulland & Bennett, 2003). This community baseline scenario is thoroughly supported by the focal issues identified through the stakeholder engagement process carried out by the Community Consultation Team (see 2.7.2).

4.5.3 BIODIVERSITY SCENARIO

The lack of permanent farmland, low fertility soils and the threat of livestock disease outbreaks would lead 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 zone. Hunting for bushmeat in African moist forests proceeds at unprecedented levels, with depletion of the resources at levels orders of magnitude higher than in other comparable ecosystems (Fa & Brown, 2009). 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. Increased edge effects would compound these effects and lead to a cascade of extirpations in the project area (Brook, Sodhi, & Bradshaw, 2008).

4.6 Additionality (G2)

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 DRC, and occurs within a logging concession leased to Safbois S.P.R.L., the project proponent. The Project Proponent also owns the rights to sequestered carbon in the project area.

4.6.1 IDENTIFICATION OF ALTERNATIVE LAND USE SCENARIOS TO THE PROPOSED VCS AFOLU PROJECT ACTIVITY

Uses in the ten years prior to Project start date:

- **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, primarily of two species *Pericopsis elata* (Afrormosia) and *Chlorophora sp.* (Iroko) due to the cost and difficulty of moving large volumes of timber down the Congo River, the only transportation artery available for bulk materials in the region, to Kinshasa.
- **Slash and Burn 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 12% of the historical reference region, and 7% of the Project Area over the past 60 years. Forest clearing now occurs on about 0.25% 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 km2) and their products are directed locally, again due to the lack of transportation arteries to markets. The main type of small-scale plantations consists of Palm Oil trees in which the fruits are harvested for food or oil production.

Other credible alternative uses are

- **Ecotourism.** The site contains a bounty of tropical rainforest biodiversity and ecotourism could be legally conducted on the concession.

4.6.2 CONSISTENCY OF CREDIBLE LAND USES WITH ENFORCED MANDATORY LAWS AND REGULATIONS:

- **Logging and Plantations** are legal land uses,
- **Slash and burn agriculture**, which essentially consists of squatting on government-owned, privately leased land; this is technically illegal but is effectively unenforced.
- **Ecotourism** – The site contains a bounty of tropical rainforest biodiversity and ecotourism could be legally conducted on the concession. However, the capacity for transporting and hosting tourists is completely undeveloped and remains infeasible.

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

4.6.3 SELECTION OF THE BASELINE SCENARIO

Continuation of the pre-project land use as logging concession, followed by deforestation in slash and burn agriculture:

For the decade prior to the implementation of the REDD project on the Isangi concession, the Project Proponent has conducted low-impact selective logging of mature trees. 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 proponent has not attempted to slow the conversion of forest to swidden 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 Reference Area.

Continued clearing of forest for agriculture 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 less than 1% of forest degradation and deforestation, remains the most profitable option for concession-holder Safbois.

4.6.4 INVESTMENT ANALYSIS – SIMPLE COST ANALYSIS

Project activities, exclusive of the profits-sharing arrangement with Safbois, are estimated at 14 million USD over the project lifetime. There are no other significant revenues from the project other than revenues to be realized from the sale of VCUs.

4.6.5 BARRIER ANALYSIS

Investment barriers

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 DRC, 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 DRC 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.

4.6.6 COMMON PRACTICE ANALYSIS

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. Moreover, there are no conservation reserves at the scale of the project area in this region of the Congo, as financial outlays would be too high.

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.

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 DRC.

Summary of Additionality Test

- 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 logging followed by 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.

Therefore the Isangi REDD Project is additional under the rules of VT0001 Tool for the Demonstration of Additionality.

4.6.7 COMMUNITY AND BIODIVERSITY BENEFITS

The community and biodiversity benefits that are project objectives would not have occurred without the project. The project area is in a remote area, unserved by the national or regional government and with no recourse available to the community other than unsustainable use of the natural resources of the area. There has been no significant government or donor-funded initiative in the project area since settlement, nor has there been a plan to do so, other than the one developed by the project proponent.

5 QUANTIFICATON OF GHG EMISSION REDUCTIONS AND REMOVALS (CLIMATE)

5.1 Project Scale and Estimated GHG Emission Reductions or Removals

Project	✓
Large project	

The GHG emissions reductions and removals as a result of the project technologies and activities is measured by Verified Carbon Units (VCUs) and is given in Table 10. Per EQ106 of VM0006, the VCUs are calculated as Net Emissions Reductions (NERs) less allocation to buffer pool (see section 5.6.4).

Years	Estimated GHG emission reductions or removals (tO2e)
2009	-726,335
2010	725,371
2011	725,180

2012	724,977
2013	724,763
2014	724,535
2015	724,294
2016	724,038
2017	723,767
2018	723,480
2019	723,175
2020	722,852
2021	722,509
2022	722,145
2023	721,759
2024	721,350
2025	720,916
2026	720,455
2027	719,966
2028	719,448
2029	718,898
2030	718,314
2031	717,696
2032	717,040
2033	716,345
2034	715,609
2035	714,830
2036	714,005
2037	713,132
2038	712,209
Total estimated ERs	20,166,722
Total number of crediting years	30
Average annual ERs	672,224

Table 10. LULC transitions (hectares) in the reference region during the reference period.

5.2 Leakage Management (CL2)

The project proponent predicts that activity shifting (geographically constrained) leakage—the increase in clearing of agricultural land in areas surrounding the project—is the most likely form of leakage to occur near the project area. Jadora anticipates two types of activity shifting leakage. The project proponent has created a leakage belt around the project area to monitor forest cover change attributed to leakage. Information obtained from the spatial model used to perform the mobility analysis of the agents and drivers of deforestation determined the boundaries of the leakage belt. Given the limited mobility of people living near the project area, Jadora estimates that the risk of either type of leakage is relatively low.

Jadora mitigates leakage risks by working in partnership with all of the communities located near the project area. Jadora designed project activities to sustainably increase agricultural production on existing farms and assist communities in growing higher value crops such as cacao. These activities provide an incentive for communities to continue farming in their current villages and reduce the need for villagers to expand farm areas either within their villages or outside of them. In addition to agricultural workshops and resources, the project provides economic and educational incentives to communities through other project activities and through the community benefits process. Jadora predicts that full implementation of project activities throughout the project zone will mitigate leakage risks by providing an array of incentives to discourage further clearing of agricultural land both inside and outside of the project area. In the case that any leakage does occur, Jadora will account for this leakage in the Monitoring and Implementation Report, in accordance with VCS rules.

5.3 Baseline Emissions (G2)

5.3.1 DELINEATING A REFERENCE REGION

The reference region boundary was created using a variety of geospatial data in order to best reflect the baseline scenario within the project area. First, all forestry concessions in the Orientale province from 1990 and 2010 government shapefiles were combined to create the reference region boundary, which includes the project area. The original concessions are shown in the Annex AV map and Annex Y map. Concession boundaries were used for the reference region due to the fact that the project itself is within Safbois concession boundaries and unplanned deforestation resulting from established logging roads occurring in the baseline scenario would be the same driver of deforestation in other concessions within the region.

Second, all protected areas and areas with planned deforestation that could be identified were excluded from the reference region boundaries including the Isangi oil palm plantation, nature reserves, and national parks (see Annex O). The remote sensing LULC analysis was used to ensure that no large deforestation events due to natural events occurred within the reference region. A finalized map of the reference region limits can be found in the Annex AW document.

Within the finalized reference region limits, the reference region itself was composed of only forested areas identified in the LULC classification starting in 1995 and areas not covered by cloud across all images. The project area is entirely forested as of the project start date and thus the reference region was selected to be entirely forested as of the project start date. Cloud cover within the reference region is unbiased and random due to the fact that the entire region is very flat with no mountain ranges, thus clouds were used as natural boundaries within the reference region limits to define the reference region. The reference region is a total of 4,174,202.7 hectares, which exceeds the both the project area size and the minimum reference region size of 250,000 ha. At the beginning of the crediting period, the reference region consisted of 91.9% forest. For a map of the reference region, see the Annex AQ document.

5.3.1.1 Similarity between reference region and project area.

An analysis of key variables between the reference region and project area can be seen in Table 11 below.

Category	Variable	Comparison
Drivers of deforestation	Drivers of deforestation	The primary driver of deforestation within the project area and reference region are the expansion of subsistence agriculture, driven by extensive agriculture and population growth, and enabled by improved access to the forest interior via logging roads. Both subsistence agriculture (cropland) and roads are present within the reference region concessions and the project area; see the Annex AZ map for evidence of these similarities.
Landscape configuration	Distribution of native forest types	There were no distinguishable forest types in the LULC analysis, such that the whole reference region and project area were classified as one forest type. This means that there are no calculable differences in forest types between the project area and reference region. See section 4.3 for methodology deviation request regarding forest stratification.
	Elevation	The entire project and reference region falls within the same 500m elevation class, therefore 100% of the reference region is within the elevation class of the project area. See Annex AX for evidence.
	Slope	Both the project area and reference region have 99% of the proportion of area contained within the 0-5% slope class. To see calculations for proportion of area in slope classes, refer to Annex AY.
Socio-economic and cultural conditions	Land-tenure status	Land tenure systems within the reference region and project area are based off of the national DRC 1973 General Property Law (Law No. 73-021). Articles 388 and 389 detail the national land tenure rights of local communities.
	Policies and regulations	Both the reference region and project area are located within the Orientale province, thus the policies and regulations that apply to the reference region and project area are the same.
	Degree of urbanization	All urban areas and settlements were excluded from the project area at the project start date and reference region at the beginning of the historical reference period. See the Annex S and Annex N maps for evidence.

Table 11. Reference region and project area comparison.

5.3.2 ANALYZE HISTORICAL DEFORESTATION/FOREST DEGRADATION

Historical deforestation was analyzed in the reference region from 1994 through early 2009. Historical degradation is conservatively excluded from the analysis because the primary driver of deforestation is subsistence agriculture. It always conservative to omit emissions in the baseline scenario.

5.3.2.1 Data

Data used to analyze historical deforestation was all Landsat 7 and Landsat 8 satellite imagery and follows Chapter 3A.2.4 of the IPCC 2006 GL AFOLU document.

Landsat imagery was chosen such that three scenes fall between 0-3 years before the project start date, 4-9 years before the project start date, and 10-15 years before the project start date. With the project start date set on August 1, 2009, imagery was chosen during the dry season from October to March during the years required by the methodology. No images older than 15 years were used. See Table 12 for imagery date selection and Table 13 for a list of all imagery used in the LULC analysis.

Scene Number	Imagery Dates	Years Before Project Start Date
1	October 1994 – March 1995	14-15
2	October 2004 – March 2005	4-5
3	October 2008 – March 2009	0-1

Table 12. Imagery date selection

Scene Number	Image Number	Date	Image Name
1	175_59	10/27/1994	LT51750591994300XXX02
1	175_60	10/27/1994	LT51750601994300XXX02
1	176_59	12/5/1994	LT51760591994339XXX02
1	176_60	1/22/1995	LT51760601995022XXX02
1	177_58	12/12/1994	LT51770581994346XXX03
1	177_59	12/12/1994	LT51770591994346XXX03
1	177_59	10/27/1995	LT51770601995045XXX00
1	178_58	1/20/1995	LT51780581995020AAA02
1	178_59	1/20/1995	LT51780591995020AAA02
1	177_60b	2/14/1995	LT51770601995045XXX00
2	175_59	2/19/2005	LE71750592005050ASN00
2	175_60	2/19/2005	LE71750602005050ASN00
2	176_58	2/10/2005	LE71760582005041ASN00
2	176_59	1/9/2005	LE71760592005009ASN01
2	176_60	2/10/2005	LE71760602005041ASN00
2	177_58	11/29/2004	LE71770582004334ASN00
2	177_59	1/16/2005	LE71770592005016ASN00

2	177_60	12/31/2004	LE71770602004366ASN00
2	178_58	12/6/2004	LE71780582004341ASN00
2	178_59	12/6/2004	LE71780592004341ASN00
3	175_59	3/18/2009	LE71750592009077ASN00
3	175_60	1/13/2009	LE71750602009013ASN00
3	176_58	10/16/2008	LE71760582008290ASN00
3	176_59	10/16/2009	LE71760592008290ASN00
3	176_60	3/25/2009	LE71760602009084ASN00
3	177_58	12/26/2008	LE71770582008361ASN00
3	177_59	11/24/2008	LE71770592008329ASN00
3	177_60	12/10/2008	LE71770602008345ASN01
3	177_60b	3/11/2007	LE71770602007070ASN00
3	178_58	11/15/2008	LE71780582008320ASN00
3	178_59	11/15/2008	LE71780592008320ASN00
Benchmark	177_59	11/24/2008	LE71770592008329ASN00
Benchmark	177_59b	12/10/2008	LE71770592008345ASN01
Benchmark	177_59c	12/26/2008	LE71770592008361ASN00
Benchmark	177_60	12/10/2008	LE71770602008345ASN01
Benchmark	177_60b	3/11/2007	LE71770602007070ASN00
Benchmark	177_60c	4/17/2009	LE71770602009107ASN00
Benchmark	177_60d	11/24/2008	LE71770602008329ASN00

Table 13. Imagery used in LULC analysis.

5.3.2.2 Land Transitions and Stocking

None of the land within the reference region is unstocked forest. Forest degradation is not being accounted for as a land transition.

5.3.2.3 Historical LULC Class and Forest Strata Transitions

No existing classification and forest stratification maps were used to calculate historical LULC class and forest strata transitions. All remote sensing data was pre-processed for use in the analysis of land cover change.

5.3.2.3.1 Pre-Processing of Remote Sensing Data

All Landsat imagery was pre-processed before being used for the creation of LULC maps and the analysis of land cover change. Images with less than 20% cloud cover throughout the whole image or less than 20% cloud cover within the project area and reference region were selected for use in the analysis. All selected images are coregistered to less than one pixel (RMSE). Images then underwent a radiometric calibration and atmospheric correction process before being used in the development of LULC class maps, as described in more detail within the Annex AS document.

5.3.2.3.2 LULC Classification and Forest Stratification

Pre-processed imagery was used in the classification process. Image pixels were classified as forest, cropland, settlement, haze, water, cloud, cloud shadow, and off image based on maximum likelihood. See Table 14 for a count of subclasses per image in Scenes 1, 2, and 3. An algebraic opening was applied to meet a minimum mapping unit of 0.5 hectares. The LULC classification was not sub-pixel based. Areas classified as no data, cloud, and cloud shadow were masked out for subsequent processing of map products, as described in the Annex AR document. Once the final LULC classification was completed, a benchmark map of the project and leakage areas was completed using primarily Scene 3 (2008-2009) imagery. Areas with missing data in the benchmark map were either filled with classified imagery from 0-3 years before the project start date or were excluded from the project and leakage areas if they could not be filled in. See Table 15 for a list of subclasses per image in the benchmark analysis.

Image Number	Cloud	Cloud Shadow	Crop	Forest	Haze	Off Image	Settlement	Water	Grand Total
Scene 1	**42**	**31**	**42**	**88**	**13**	**9**	**14**	**36**	**275**
175_59	4	16	4	13	2	1		2	42
175_60	5	5	1	7	2	1		1	22
176_59	1	2	1	10		1		5	20
176_60	2	1	5	7		1	3	5	24
177_58	1		4	16	3	1	3	6	34
177_59	2	3	6	9	1	1		3	25
177_60b	13	3	4	2	5	1	1	4	33
178_58	10	1	14	12		1	5	7	50
178_59	4		3	12		1	2	3	25
Scene 2	**32**	**32**	**30**	**66**	**11**	**10**	**1**	**25**	**207**
175_59	5	3	2	11	2	1		1	25
175_60	5	7	2	5	3	1		1	24
176_58		1	4	7		1		3	16
176_59	2	4	3	11		1		4	25
176_60	1	2	1	4		1	1	4	14
177_58	5	2	4	3	2	1		1	18
177_59	4	3	2	6		1		4	20
177_60	3	7	2	5	3	1		1	22
178_58	4	3	4	9		1		2	23
178_59	3		6	5	1	1		4	20
Scene 3	**58**	**51**	**51**	**110**	**12**	**11**	**12**	**29**	**334**
175_59	5	8	1	12	1	1		3	31
175_60	3	8	2	16		1		1	31
176_58	9	3	4	12		1		1	30
176_59	5	5	3	7	1	1		2	24
176_60	7	3	13	5	3	1	3	4	39

177_58	1	1	4	8		1		3	18
177_59	1	3	6	14	1	1	1	4	31
177_60	9	4	4	11	1	1	2	2	34
177_60b	13	7	4	16	5	1	2	3	51
178_58	1	5	6	6		1	2	3	24
178_59	4	4	4	3		1	2	3	21
Grand Total	**132**	**114**	**123**	**264**	**36**	**30**	**27**	**90**	**816**

Table 14. Subclass counts per image for Scenes 1, 2, and 3.

Image Number	Cloud	Cloud Shadow	Crop	Forest	Haze	Off Image	Settlement	Water	Grand Total
Benchmark	**47**	**29**	**38**	**70**	**11**	**11**	**12**	**21**	**239**
177_59	1	3	6	14	1	1	1	4	31
177_59b	7	5	7	4	1	2	2	4	32
177_59c	5	2	6	10	2	2	3	3	33
177_60	9	4	4	11	1	1	2	2	34
177_60b	13	7	4	16	5	1	2	3	51
177_60c	5	6	5	6	1	2	1	2	28
177_60d	7	2	6	9		2	1	3	30
Grand Total	**47**	**29**	**38**	**70**	**11**	**11**	**12**	**21**	**239**

Table 15. Subclass counts per image for the benchmark classification.

5.3.3 ANALYZE DEFORESTATION/DEGRADATION AGENTS AND DRIVERS

5.3.3.1 Assessing Impacts from Drivers of Deforestation/Degradation

An analysis of the relative contribution to deforestation of each of the drivers present within the reference region was estimated using equations 1, 2, and 4 in Table 8 of VM0006. Stock data used in the analysis came from inventory data that is elaborated on in section 5.3.4.1 and the areas deforested were from the results of the remote sensing analysis and are described in section 5.3.2.3. The results of the analysis of drivers are summarized in Table 16 and can also be found in the Annex BB document. Table 11 shows an estimate of the annual carbon loss per year and the relative driver contribution to historical deforestation. Driver contribution to annual degradation was not calculated because degradation is being conservatively excluded from the overall GHG reductions and removals analysis.

Driver	Total Change in Carbon Stocks (Mg DM yr^{-1})	Contribution of Carbon Loss (fraction)
Subsistence Agriculture	203952.227	0.899035346
Settlement	22902.9626	0.100957823
Degradation	1.549504602	6.83032E-06

Table 16. Relative contribution per driver to annual deforestation.

5.3.3.2 Analyzing Mobility of Agents

As the majority of the drivers of deforestation indicate carbon loss attributed to substance agriculture, the agent of deforestation are people living near the project area who may exploit the road network created and maintained by Safbois in the baseline scenario. Based on the results of a social appraisal, the maximum distance people are willing to travel for agricultural purposes is 12 km along existing roads (see Annex BM. This estimate was determined by first taking the median response within village and subsequently the maximum across villages surveyed.

Driver	Main Mode of Transportation	Speed (km/hr)	Maximum cost (hours)
Subsistence Agriculture	Foot	5	2.4
Settlement	Foot	5	2.4

Table 17. Mobility of agents related to driver.

5.3.3.3 Identifying Driving Variables of Deforestation/Degradation

Based on the results from section 5.3.3.1 and analysis of the reference region, some spatial driving variables have been selected and are presented in Table 18. Based on this analysis, the reference region did not need to be adjusted as it is in proximity to roads and recently cleared forest.

Driver	Spatial Driving Variable	Predisposing Factors
Subsistence Agriculture	Access to forest (roads or trails)	Access to forest is necessary for anthropogenic deforestation as roads or trails are required to remove harvest subsistence crops.
Subsistence Agriculture	Distance to recently cleared forest	Recently cleared forest indicates the presence of suitable soil conditions for agriculture.
Settlement	Access to forest (roads or trails)	Access to forest is necessary for anthropogenic deforestation as roads or trails are inherent in new settlements.
Settlement	Distance to recently cleared forest	Recently cleared forest indicates suitable proximity to new cropland for the cultivation.

Table 18. Spatial driver variables.

5.3.4 DETERMINING EMISSIONS FACTORS

5.3.4.1 Data Sources

Ex-ante GHG emissions reductions and removals are based on three data sources listed in Table 19. The project area is not currently registered in a JNR program and therefore biomass stock data from a JNR program is not a selected data source.

Data Source	Methodology	Application
Field Sample	See section 5.3.4.2, randomly selected plots in LULC classes.	Applied to estimate carbon stocks in forest, cropland and settlement LULC classes.
Verification Report for the Mai Ndombe REDD+ (see Annex BF)	Randomly selected plots in forest and non-forest areas. Non-forest areas represent carbon stocks in the end land use after deforestation.	Used for quality assurance of forest inventory estimates of above-ground biomass and literature estimates of soil organic matter.
IPCC	Defaults allowed by VCS and VM0006.	Root-to-shoot ratios for estimation of below-ground biomass.

Table 19. Selected data sources for ex-ante estimates.

5.3.4.2 Sampling Design

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 aluminum tag at DBH point on the south side of the tree. Jadora foresters identify trees to species 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.

5.3.4.2.1 **Sample Size & Plot Allocation:**

The sample size rational 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 (541) permanent plots are located in forest areas in the Isangi Territory, RDC (see Annex X). The plot site locations are determined by using satellite imagery. To avoid bias the placement of plots was determined using a 2009 Landsat 5 TM 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].

5.3.4.2.2 **Sample Framework for Field Data, including Size, Layout, and Location:**

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. Density of trees represented by the encounter of tree j, or dj, was 1/pj where pj 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 m2, which represents 0.0201 hectares. Thus, the encounter of a single tree in the interior quadrat implies that there are 1/pj trees like it in a hectare. Similarly, trees 20 < DBH < 50 centimeters were sampled only in the center or middle quadrats, an area of 618 m2, representing 0.0618 of a hectare. The occurrence of a middle size tree implied 16.24 trees like it in a hectare. Finally large trees (> 50 centimeters dbh) were counted in the entire 20 meters radius quadrat, and the occurrence of one implied 7.95 trees like it in a hectare.

The Annex X map presents the systematic sampling layout of forest plots in the project area.

Locations of plots within the project area were gridded to impose systematic sampling because of a lack of obvious forest stratification, and locations of groups of 9 sampling plots were chosen from a grid of sites to increase the extent of sampling to most of the project area.

5.3.4.3 Measure and Calculate Carbon

Standing stocks of carbon for plot *I* 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*,

$$SC = \sum_{j}^{n} BC_j \delta_j \quad [1]$$

5.3.4.3.1 **Allometric Equations**

Very few studies have attempted to develop species-specific and site-specific allometric equations in the Congo Basin, even though the Congo Basin holds the second largest tropical forest bloc in the world (Djomo et al., 2011; Ebuy et al., 2011). Consequently, most carbon estimate works in Central Africa are based on pan-tropical allometric equations developed using data from outside the Congo Basin (Chave et al., 2005; Brown, 1997). Log-transformed linear models are widely used in the Democratic Republic of the Congo by the national government agencies and private logging companies to relate the merchantable tree volume to DBH.

Recently, Ebuy et al. (2011) have published allometric equations using destructive sampling of three species in the Yangambi area (Orientale Province) in the Democratic Republic of the Congo. (Djomo,

Ibrahima, Saborowski, & Gravenhorst, 2010) have also built and tested allometric equations in the lowland forest of Cameroon (Campo-Ma'am forest). Published multi-species equations (Djomo et al., 2010; Ebuy et al., 2011) will be used for biomass.

The first regression equation is an adaptation of a linear log-transformed regression from Djomo (2010), adapted to local conditions using data from (Ebuy & Lokombe, 2011). This model relates AGB to DBH and specific gravity as:

$$\ln(AGB) = \alpha + \beta_1 \ln(D) + \beta_2 ln\rho \quad [2]$$

Where: AGB is the above ground biomass in Kg, α, β_1 and β_2 are fitted parameters from the Ordinary Least Square (OLS) model, D is the DBH (cm) and ρ is the tree specific gravity (g/cm^3).

Djomo et al. (2010) give an Adj. R^2 of .96. While the authors do not report p-values, a model with such an r^2 would be significant at the 95% confidence level. The authors report a mean percent relative error of 7%.

For equations used, the wood specific gravity values were obtained first from the CIRAD (Centre International pour la Recherche Agronomique et le Developpement) database and from the Global Wood Density Database, when data were unavailable in the CIRAD database. For values that were missing in either one of the previous databases, a mean density from all the species found in the study site was used.

As the model is log transformed, final biomass estimates entails bias which usually results in underestimation of the real biomass values (Chave et al., 2005). Chave (2005) has proposed a first order correction for this effect by multiplying the estimates with a correction factor:

$$CF = \exp(\frac{RSE^2}{2}) \quad [3]$$

Where RSE is the standard error of residuals resulting from the regression model and CF is the model correction factor. This factor was used correct the log-transformed linear equation [2].

Fitting the log-transformed linear model (hereafter referred to as local model) with the data from the Democratic Republic of the Congo (Ebuy et al., 2011) using DBH only and using both the DBH and the specific gravity returned the following model parameters values:

α	β_1	β_2	R^2	P-value	S
5.555972	0.042893		0.74046	.000328	0.234868
1.50217	1.545901	-0.34021	0.731824	0.02678	0.251658

The log-transformed linear model relating the DBH to the AGB explained 74% of the deviance with a standard deviation of 0.23. Adding the specific gravity to this model did not significantly improve the

model. Indeed, the proportion of the variance explained by the model dropped slightly to 73.2% with a slightly high standard deviation as well (0.25).

The range of the diameters in the inventory is 5 to 155.7 cm. The range of the diameters in Djomo et al., (2010) is 5 to 170 cm across all species in the study.

Belowground biomass was estimated based on the root/shoot ratio for tropical forests from table 4.4 of the IPCC GPG for GHG Inventories (Aalde et al., 2006)

5.3.4.4 Calculating Emission Factors

Emissions factors for each LULC transition and carbon pool are based on the data described in section 5.3.2.1. Emissions factors for above-ground living biomass were estimated using field data while below-ground biomass using the IPCC ratios as described in section 5.3.4.3. Literature values for soil organic matter were used for the purposes of ex-ante estimates of emissions factors. These literature estimates were attained from the verification report for the Mai Ndombe REDD+ Project in the DRC (see Annex BF).

Emissions factors for below-ground biomass were distributed over 10 years as required by VCS and VM006. Likewise, emissions factors for soil were distributed over 20 years. All ex-ante emissions factors are given in Annex BG. As all estimates of carbon stocks were highly precise, no deductions were applied in the calculation of emissions factors (see calculated uncertainty factors in Annex BH).

5.3.5 RATES OF DEFORESTATION

5.3.5.1 Calculating Rates of Deforestation/Degradation

The rates of deforestation in the reference region are shown in Figure 4. Because three scenes were used to calculate the deforestation rates, Equation 35 of VM0006 is equal to the average of these rates. The average rate is 37,975.5 ha/yr which equates to 0.91% of the reference region, per year. The calculation of the

This estimate is higher than some literature estimates for the entire DRC because it is based on a reference region that is comprised of timber concessions designated for road construction and resource extraction. Additionally, as required by VM0006, all transitions “from” forest are counted toward the deforestation rate; the reference region borders several rivers which meander over time. Finally, the deforestation rate for the reference region does not include regeneration of non-forest areas into forestland. Accounting for the effects of water and regeneration, to produce a comparable estimate of deforestation rate to other studies, then the adjusted deforestation rate for the reference region is 14% per year, well-below national averages.

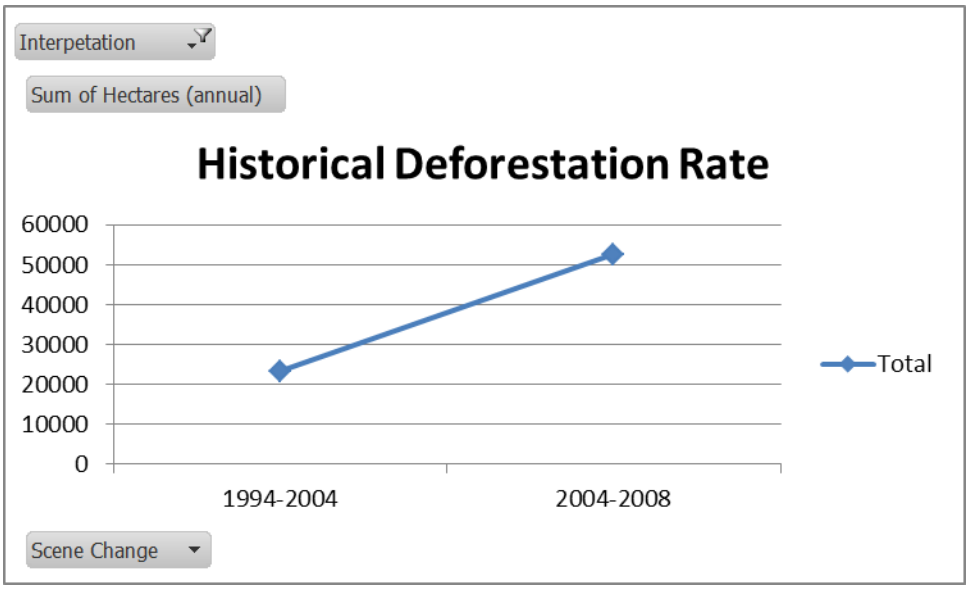

Figure 4. Historical deforestation rates in the reference region (y-axis is hectares per year, x-axis is time).

The deforestation rates for the project area and leakage area are calculated according to the methodology by adjusting the deforestation rate for the reference region using the proportional size of the leakage area or project area, respectively, to the size of the reference region. Accordingly, the adjusted deforestation rate for the project area is 1,835.28 ha/yr and for the leakage area it is 774.45 ha/yr. Calculations are given in Annex BJ and Annex BK. These estimates of deforestation rates were then used in the spatial model to determine the baseline LULC transitions in the project area and leakage area (see section 5.3.5.3).

5.3.5.1.1 Summarize Historical Land Use

Historical LULC classes are presented in Table 20 which shows a decrease in forest over time and increases in cropland and settlement.

LULC Classification	Scene 1 (ha)	Scene 2 (ha)	Scene 3 (ha)
Forest	4,174,202.70	3,940,724.97	3,839,735.79
Cropland	0.00	219,631.68	271,183.05
Settlement	0.00	2,191.05	6,119.91
Total	4,174,202.70	4,174,202.70	4,174,202.70

Table 20: reference region LULC classifications (hectares) for each scene in the reference period.

5.3.5.1.2 Summarize Historical Land Transitions

Historical LULC transitions in the reference region are summarized in Tables 21 and 22. Table 21 is a summary of total change while Table 22 is a summary of change rate in the reference region.

LULC Transition	Scene 1 to 2 (ha)	Scene 2 to 3 (ha)
Cropland to Cropland		116,813.97
Cropland to Forest		99,018.81
Cropland to Settlement		986.85
Cropland to Water		2,812.05
Forest to Cropland	219,631.68	152,536.59
Forest to Forest	3,940,724.97	3,730,311.81
Forest to Settlement	2,191.05	4,940.19
Forest to Water	11,655.00	52,936.38
Settlement to Cropland		1,567.98
Settlement to Forest		523.08
Settlement to Settlement		83.16
Settlement to Water		16.83
Water to Cropland		264.51
Water to Forest		9,882.09
Water to Settlement		109.71
Water to Water		1,398.69

Table 21. LULC transitions (hectares) in the reference region during the reference period.

LULC Transition	Scene 1 to 2 (ha/yr)	Scene 2 to 3 (ha/yr)
Cropland to Cropland		29,203.49
Cropland to Forest		24,754.70
Cropland to Settlement		246.71
Cropland to Water		703.01
Forest to Cropland	21,963.17	38,134.15
Forest to Forest	394,072.50	932,577.95
Forest to Settlement	219.11	1,235.05

Forest to Water	1,165.50	13,234.10
Settlement to Cropland		391.10
Settlement to Forest		130.77
Settlement to Settlement		20.79
Settlement to Water		4.21
Water to Cropland		66.13
Water to Forest		2,470.52
Water to Settlement		27.43
Water to Water		349.67

Table 22. LULC transition rates (hectares per year) in the reference region during the reference period.

LULC Transition	Scene 1 to 2 (ha/yr)	Scene 2 to 3 (ha/yr)
Forest to Cropland	21,963.17	38,134.15
Forest to Settlement	219.11	1,235.05

Table 23: Anthropogenic deforestation rates (ha/yr) in the reference region during the reference period.

LULC Transition	Scene 1 to 2 (ha)	Scene 2 to 3 (ha)
Forest to Cropland	219,631.68	152,536.59
Forest to Settlement	2,191.05	4,940.19

Table 24: Anthropogenic deforestation (hectares) in the reference region during the reference period.

LULC Transition	Scene 1 to 2 (ha)*	Scene 3 (ha)
Cropland to Forest	0.00	99,018.81
Settlement to Forest	0.00	523.08
Water to Forest	0.00	9,882.09

Table 25: LULC transitions to forest (hectares) in the reference region during the reference period (*scene 1 only contained forest at the beginning of the historic LULC analysis).

5.3.5.2 Calculating Regeneration Rates

Regeneration rates were determined for each transition from non-forest to forest and are given in the following tables. The average fractions of regeneration per year are presented in Table 29, calculated in Annex AT.

LULC Transition	Scene 1 to 2 (ha)*	Scene 2 to 3 (ha)
Cropland to Forest	0.00	99,018.81
Settlement to Forest	0.00	523.08

Table 26: Anthropogenic regeneration (hectares) in the reference region during the reference period.

LULC Transition	Scene 1 to 2 (ha/yr)	Scene 2 to 3 (ha/yr)
Cropland to Forest	0.00	24,754.70
Settlement to Forest	0.00	130.77
Water to Forest	0.00	2,470.52

Table 27: Regeneration rates (hectares/year) in the reference region during the reference period.

LULC Transition	Scene 1 to 2 (ha)	Scene 2 to 3 (ha)
Cropland to Forest	0.00	99,018.81
Settlement to Forest	0.00	523.08
Water to Forest	0.00	9,882.09

Table 28: Regeneration (hectares) in the reference region during the reference period.

LULC Transition	Average Rate (fraction/yr)
Cropland to Forest	0.056355036
Settlement to Forest	0.029841857
Water to Forest	0.105985521

Table 29: Average regeneration (fraction/yr) in the reference region during the reference period.

5.3.5.3 The Spatial Model

The spatial model is applied to the deforestation rates calculated for the project and leakage areas, respectively, in the project and leakage areas, separately. The deforestation rates are calculated in section **5.3.5.1**. The spatial model includes a scarcity factor which applied to the deforestation rate to select pixels for deforestation using a parameterized categorical model. The results of the spatial model are summarized in a non-spatial manner as required by VM0006 to determine the LULC transitions in the baseline scenario for the project area and the leakage area, separately.

5.3.5.3.1 Scarcity Factor

The scarcity factor was determined by analyzing the reference region where deforestation is more advanced than the project area. As of the project start date, the reference region was XX percent forest

while the project area was 100% forest. The scarcity factor was estimated from as the function provided in VM0006 using the historical LULC data in the reference region.

The scarcity factor is a function of the area of non-forest A_t at time t. This function is written as

$$f(A_t) = \frac{1}{1 + e^{sc_1\left(sc_2 - \frac{A_t}{A}\right)}} = \frac{1}{1 + e^{sc_1 sc_2 - \frac{sc_1 A_t}{A}}}$$

where A is the size of the project area and sc_1, sc_2 are the parameters. Letting $sc_3 = sc_1 sc_2$ then the function is rewritten as

$$f(A_t) = \frac{1}{1 + e^{sc_3 - \frac{sc_1 A_t}{A}}}.$$

The cumulative amount of forest that is deforested at time t is calculated as

$$A_t = A_{t-1} + l_t D f(A_{t-1}) = A_{t-1} + \frac{l_t D}{1 + e^{sc_3 - \frac{sc_1 A_{t-1}}{A}}} \quad [4]$$

where D is the deforestation rate (ha/yr) and l_t is the number of years between time $t-1$ and t. Note that in the application of the spatial model, $l_t = 1$ because it is on an annual time step. In the case of the analysis of the reference region data, $l_t > 1$. From the above equation, the scarcity factor is reparameterized in terms of the difference between the area of forest at time t and at time $t-1$ as

$$\frac{l_t D}{A_t - A_{t-1}} - 1 = e^{sc_3 - \frac{sc_1 A_{t-1}}{A}}$$

which is equivalent to

$$\frac{e^{sc_3}}{e^{\frac{sc_1 A_{t-1}}{A}}} = \frac{l_t D}{A_t - A_{t-1}} - 1 = \frac{l_t D - A_t + A_{t-1}}{A_t - A_{t-1}}$$

and gives the identities

$$e^{sc_3} = k(l_t D - A_t + A_{t-1})$$

$$e^{\frac{sc_1 A_{t-1}}{A}} = k(A_t - A_{t-1})$$

where k is an unknown scalar. From the first identify, the equation for sc_3 is

$$sc_3 = \ln(l_t D - A_t + A_{t-1}) + \ln(k)$$

and from the second the equation for sc_1 is

$$sc_1 = \frac{\ln(A_t - A_{t-1})\, A + \ln(k) A}{A_{t-1}}.$$

Using the earlier substitution with equivalence $sc_2 = \frac{sc_3}{sc_1}$, the equation for sc_2 is

$$sc_2 = \frac{\ln(l_t D - A_t + A_{t-1})A_{t-1} + \ln(k)A_{t-1}}{\ln(A_t - A_{t-1})\,A}.$$

Provided that three scenes generate the historical LULC data for the reference region, only two differences can be calculated. Hence the estimates for the parameters $\widehat{sc}_1$ and $\widehat{sc}_2$ are taken to be a linear combination of the data, assuming stationary in the differences, as

$$\widehat{sc}_1 = \frac{w_1 A \ln(A_2 - A_1) + \ln(k)A}{A_2} + \frac{w_2 A \ln(A_3 - A_2) + \ln(k)A}{A_3}$$

$$\widehat{sc}_2 = \frac{w_1 A_2 \ln(l_2 D - A_2 + A_1) + \ln(k)A_2}{\ln(A_2 - A_1)\,A} + \frac{w_2 A_3 \ln(l_3 D - A_3 + A_2) + \ln(k)A_3}{\ln(A_3 - A_2)\,A}$$

where A_1, A_2 and A_3 are the areas of non-forest at times one, two and three of the historical reference period, respectively, and the weights

$$w_1 = \frac{l_2}{l_2 + l_3}$$

$$w_2 = \frac{l_3}{l_2 + l_3}$$

are taken to be the length of time between observations of the reference region normalized by the length of the historical reference period. The value of k is found by solving for sc_1 and sc_2 then finding k to be the value that gives $f(0) \approx 1$ which implies no adjustment to the deforestation rate when the reference region is all forest (not containing non-forest). Because the estimates $\widehat{sc}_1$ and $\widehat{sc}_2$ are conditional on k, a Newton-Raphson algorithm is applied until the iterated values converge.

Based on the analysis in, the parameter estimates for the scarcity factor are presented below.

Parameter	Estimate
sc_1	-6.6
sc_2	0.83

Table 30. Estimated scarcity factor parameters.

5.3.5.3.2 **Parameterization**

The spatial model is an autoregressive categorical model in the time domain of deforestation, assuming first-order stationarity. The model was parameterized under the assumption that the deforestation event Y_t of a pixel y at time t is independent and identically distributed. This is a common assumption manifested in VM0006 and other approved VCS methodologies. Implicitly, the model is written as

$$Y_t = \alpha Y_{t-1} d(y, t-1) c(y, t-1) + \epsilon \qquad [5]$$

where $Y_t > 0$ if deforested, $Y_t = 0$ if not deforested, α is the autogressive parameter and $d(y, t-1)$ is a function that gives the relative distance between the pixel y and the closest deforestation event in the spatial domain and $c(y, t-1)$ is a function that gives the class of the closest pixel at the previous time

step. The methodology requires the inclusion of distance to forest edge, where here the interpretation is the function $d(y, t-1)$ which is effectively the distance to newly cleared forest edge and captures the spatial driver variable distance to road as newly cleared forest edge is inherently accessible. Class ranges from 0 as forest to 4 where $Y_t > 0$ is non-forest. The density of the error term ϵ is assumed to be generalized Bernoulli distributed. The model was parameterized using logistic regression in the statistic program R.

The model was calibrated using approximately 2/3 of the pixels in the reference region from scenes 2 and 3. Scene 1 was not used because it was not preceded by an earlier scene. Test statistics for the autogressive parameter inferred statistical significance from zero at the 95% level. Comparing model predictions to remaining 1/3 of pixels as validation set gave a prediction accuracy of 98% as measured by the number of correctly predicted transitions to observed transitions across scenes 2 and 3.

5.3.5.4 Calculate Transition Rates

The parameterized spatial model and forest scarcity factor were applied to the benchmark map to predict the location of deforestation in the project area and the leakage area, separately. The procedure for selecting deforested cells at each time step was to first apply equation [5]. For each cell selected for deforestation at the time step, the probability of deforestation was estimated using the cumulative distribution

$$P(Y_t > 0) = \sum_{Y_t=1}^{4} \alpha Y_{t-1} d(y, t-1) c(y, t-1) + \epsilon$$

and the forest scarcity factor was updated using equation [4]. The predicted class by [5] was assigned to deforested pixels after the scarcity factor was applied at each time step. The equations were implemented in statistical computing language R on a non-spatial data frame. Per the methodology, the results are aggregated into LULC transition tables that are provided in sections 5.4 and 5.5. The resultant baseline LULC change for the project area and leakage area, over time, are provided in Annex BC and Annex BD.

5.3.6 CALCULATE BASELINE EMISSIONS

Since no ANR activities are planned, the baseline emissions are calculated by the results of the spatial model from section 5.3.5.3 adjusted for regeneration rates from section 5.3.5.2. The resultant baseline emissions for the project area and leakage area, over time, are provided below (see Annex BE). Table 31 does not conform with the VM0006 accounting requirements and is not used to estimate emissions reductions or removals.

Year	Baseline Emissions in Project Area (tCO2e)	Baseline Emissions in Leakage Area (tCo2e)
2009	516,808	516,911
2010	1,172,583	1,141,622
2011	1,091,392	1,041,299
2012	1,010,201	940,324
2013	929,012	838,751

2014	847,824	736,658
2015	766,638	634,158
2016	685,454	531,399
2017	604,272	428,570
2018	523,092	325,899
2019	441,914	223,655
2020	360,738	122,144
2021	279,565	21,708
2022	198,396	-77,283
2023	117,229	-174,442
2024	36,065	-269,373
2025	-45,094	-361,684
2026	-126,250	-450,999
2027	-207,401	-536,970
2028	-288,547	-619,287
2029	-369,688	-697,688
2030	-450,823	-771,967

Table 31. Estimated emissions or removals in the baseline scenario for the project area and leakage area (note negative emissions imply removals as a result of compounding regeneration as required by VM0006).

5.4 Project Emissions (CL1)

5.4.1 QUANTIFYING THE EFFECTIVENESS OF PROJECT ACTIVITIES

5.4.1.1 Effectiveness of Strengthening Land Tenure Status

Strengthening land tenure status is not a current project activity to address the relevant drivers of deforestation.

5.4.1.2 Effectiveness of Sustainable Land Use Plans

The effectiveness of sustainable land use plans was calculated using equations 46 from table 11 of VM0006 v2.1. The land use plans developed between Jadora and the communities do not permit the clearing of forest to cropland or settlements, thus the area of allowed cropland or settlement is zero and the effectiveness is equal to 1. The effectiveness of sustainable land use plans on the conversion from forest to settlement and clearing of forest for commercial logging were conservatively omitted.

5.4.1.3 Effectiveness of Property Demarcation

Property demarcation is not a current project activity to address the relevant drivers of deforestation.

5.4.1.4 Effectiveness of Fire Prevention

Fire prevention is not a current project activity to address the relevant drivers of deforestation.

5.4.1.5 Effectiveness of Increased Energy Efficiency

Increased energy efficiency is not a current project activity to address the relevant drivers of deforestation.

5.4.1.6 Effectiveness of Alternative Fuelwood Sources

The development of alternative fuelwood sources is not a current project activity to address the relevant drivers of deforestation.

5.4.1.7 Effectiveness of Agricultural Intensification

The effectiveness of agricultural intensification is conservatively estimated to be zero.

5.4.1.8 Effectiveness of Alternative Livelihoods

The effectiveness of alternative livelihoods is conservatively estimated to be zero.

5.4.1.9 Total Effectiveness of Project Activities

The total effectiveness of project activities is calculated per equations 64 and 66 of VM0006 in Annex BL. The calculated total effectiveness is 0.899035346 and is used to estimate emissions from agricultural intensification.

5.4.2 QUANTIFYING EMISSIONS FROM PROJECT ACTIVITIES

5.4.2.1 Quantifying Emissions from Agricultural Intensification

Emissions from agricultural intensification are estimated per equation 68 of the methodology which oddly gives a deforestation rate that is later applied in equation 107 to determine emissions using emissions factors. There appears to be an error in the application of the effectiveness factor in equation 68 as it should be applied to the baseline deforestation rate in the project area as one minus effectiveness. This correction has been made to the calculation of the deforestation rate from agricultural intensification in Annex BL. Since agricultural intensification is practiced on cropland, this rate is applied in equation 107 to determine emissions.

5.4.2.2 Quantifying Emissions from Flooded Rice Production

Flooded rice production is not a project activity and thus emissions are zero.

5.4.2.3 Quantifying Emissions from Livestock Stocking

Live stocking is not a project activity and thus emissions are zero.

5.4.2.4 Estimating GHG Emissions from Fire Breaks

Fire breaks are not a project activity and thus emissions are zero.

5.5 Leakage (CL2)

5.5.1 ESTIMATE LEAKAGE FROM GEOGRAPHICALLY CONSTRAINED DRIVERS

5.5.1.1 Calculating Effects of Leakage on Deforestation/Degradation Rates

Leakage-induced increases in deforestation rates were calculated using equation 81 of VM0006 in Annex BN. The leakage-induced increase in deforestation is the relative leakage impact multiplied by the relative driver impact. The relative driver impact of deforestation is calculated in section 5.3.3.1 and the relative leakge impact is calculated in the following section.

5.5.1.2 Calculating Leakage Cancellation Rates

As the only driver that directly results in deforestation is subsistence agriculture, the relative leakage impact of subsistence agriculture is the calculation rate for subsistence agriculture. The relative leakage impact is calculated in Annex BN per equation 83 of the methodology.

5.5.1.2.1 Calculation of Cancellation Rates for Subsistence Agriculture

The cancellation rate for subsistence agriculture is 0.127599256 per equation 85 of the methodology and is calculated in Annex BN using the results from section 5.4.2, the projected deforestation rate in the project scenario.

5.5.1.2.2 Calculation of Cancellation Rates for Logging

Based on the results from section 5.3.3.1, logging contributes nearly zero baseline emissions compared to deforestation to cropland. Therefore, no matter what cancellation rate is selected for logging, it contributes nearly zero to relative leakage impact because the associated relative driver impact is nearly zero. It is always conservative to ignore emissions in the baseline scenario.

5.5.1.2.3 Calculation of Cancellation Rate for Fuelwood Collection

Fuelwood collection was not identified in section 5.3.3.1, therefore it is zero.

5.5.1.2.4 Calculation of Cancellation Rate for Cattle Grazing

Cattle's grazing was not identified in section 5.3.3.1, therefore it is zero.

5.5.1.2.5 Calculation of Cancellation Rate for Extraction of Understory Vegetation

The extraction of understory vegetation was not identified in section **5.3.3.1**, therefore it is zero.

5.5.1.2.6 Calculation of Cancellation Rate for Human-Induced Forest Fires

Human-Induced forest fires were not identified in section 5.3.3.1, therefore it is zero.

5.5.1.3 Delineating the Leakage Area and Leakage Belts

Based on the results provided in section 5.3.3.2 a cost-of-transportation-based GIS approach was used to define the leakage belts. The leakage area is the sum of all leakage belts. All roads in the project area limits, as of the project start date were, mapped from high–resolution or historic Landsat imagery (see section 4.4 for discussion of project boundaries and project area limits). These roads falling within the project area limits were then used to create a 30-meter resolution raster map of transportation cost relative to the roads, where each raster cell was an estimate of transportation cost in terms of number of hours. The cost was estimated using a walking rate of 5 km/hr as described in section 5.3.3.2. Based on the results of the social survey, also described in section 5.3.3.2, the maximum cost of the 2.4 hours was used to define those raster calls for the leakage belts. The leakage belts equated to a 12 km buffer from the roads.

A map of the leakage area is provided in Annex BO. Per the requirements of VM0006, the leakage area are contains both forest and non-forest.

5.5.1.4 Calculating Deforestation/Degradation Rates in the Leakage Belts

5.5.2 ESTIMATE LEAKAGE FROM GEOGRAPHICALLY UNCONSTRAINED DRIVERS

No geographically unconstrained drivers were identified in section 5.3.3.1, therefore equation 98 in the methodology equals zero.

5.5.3 ESTIMATING EMISSIONS FROM LEAKAGE

Emissions from leakage were estimated using equation 96 as no coherent accounting methods are described in the methodology relating leakage-induced increases in deforestation to equation 108. Since the primary driver in the baseline scenario is subsistence agriculture, it is assumed that the leakage-included increase in deforestation results in new cropland in the leakage area. Therefore, the leakage-induced increase in deforestation is added the deforestation predicted in section 5.3.5.4 as calculated in Annex BN.

5.6 Summary of GHG Emission Reductions and Removals (CL1 & CL2)

Net GHG emissions reductions and removals are calculated using equation 105 of VM0006. Net GHG emissions reductions and removals from avoided deforestation excluding ANR and harvest areas are calculated using equation 107 while for leakage equation 108. As required by the methodology, the individual terms of equation 105 are provided in Table 32 and Annex BP. The value for wood products is from equation 113, described in section 5.6.2.

Individual Term of Equation 105	Description	Value (tCo2e)	Explanation
❶	ΔGHG from avoided deforestation excluding ANR and harvest areas	31,463,881	Included, major source of emissions reductions.
❷	ΔGHG from deforestation due to leakage	-4,999,691	Included as described in section 5.5.
❸	ΔGHG from avoided degradation	0	Degradation is omitted as the drivers are for deforestation,

			as discussed in section 5.3.3.
❹	ΔGHG from degradation due to leakage	0	Degradation is omitted as the drivers are for deforestation, as discussed in section 5.3.3.
❺	ΔGHG from leakage by unconstrained geographic drivers	0	There are no unconstrained geographic drivers, see section 5.5.3.
❻	ΔGHG from assisted natural regeneration	0	Omitted as ANR is not an included project activity.
❼	ΔGHG from changes in long-lived wood products	-5,864	Included per calculations in section 5.6.2.
❽	ΔGHG from improved cookstoves	0	Omitted as CFE is not an included project activity.
❾	ΔGHG from other and secondary sources	0	No other secondary sources exist.
❿	ΔGHG from avoided deforestation from areas under harvest	0	Omitted as harvesting is not an included project activity.
NERs		**26,458,325**	**Over entire crediting period**

Table 32. Terms of equation 105 in VM0006, for the entire crediting period.

5.6.1 CARBON STOCKS IN WOOD PRODUCTS

The calculation of wood products is provided in Annex BQ using equations 102 and 103 from the methodology. A total of 18 species could have been harvested in the baseline scenario, as evidenced by Safbois permits from before the project start date (see Annex BR). Using the inventory data, the mean standing volume per acre per species was estimated in Annex BS along with precision. For the baseline scenario, the conservative estimate of the upper HWCI was selected per the requirements of VM0006. No harvesting is allowed in the project scenario inside the project area.

Using historical harvest maps that show the approximate size of annual harvest (see Annex BT), annual estimates of baseline harvest volumes were calculated in Annex BU. Based on this analysis, the average size of harvest blocks is 756.5 ha/yr and the annual harvest volume across all species is 25,477 cubic meters. Converting this estimate using equation 102 from the methodology gives 8,768 tC per year in log export (see Annex BQ).

The equivalent long-lived wood products per year based on equation 103 from the methodology using a wood waste fraction of 0.24 for developing countries, a factor of 0.2 for sawnwood and a factor of 0.85 for tropical sawnwood. All wood products derived from the concession are used for sawnwood. The annual amount of carbon stored in long-lived wood products in the baseline scenario is approximately 799.67 tC, conservatively based on the upper HWCI of inventory estimates.

5.6.2 ESTIMATE EX-ANTE NERS

Estimated ex-ante NERs are generated per equation 105 of VM006 which does not conform to the template for estimated emissions reductions over time. Therefore, the estimated baseline emissions or removals are presented as the result of equation 107 minus equation 113 for wood products. Estimate leakage emissions are presented as the result of equation 108 and estimated project emissions is set to zero. Mathematically, ex-ante project emissions are captured in equation 107. The methodology does not provide an equation to estimate project emissions or removals over time.

Years	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
2009	373,719	0	-1,025,310	-651,591
2010	1,079,398	0	-138,147	941,251
2011	1,079,104	0	-138,104	941,001
2012	1,078,793	0	-138,057	940,736
2013	1,078,463	0	-138,008	940,455
2014	1,078,112	0	-137,955	940,157
2015	1,077,741	0	-137,899	939,842
2016	1,077,347	0	-137,840	939,507
2017	1,076,929	0	-137,777	939,153
2018	1,076,487	0	-137,710	938,777
2019	1,076,017	0	-137,639	938,378
2020	1,075,520	0	-137,564	937,956
2021	1,074,992	0	-137,485	937,507
2022	1,074,433	0	-137,401	937,032
2023	1,073,841	0	-137,313	936,528
2024	1,073,214	0	-137,221	935,993
2025	1,072,549	0	-137,123	935,426
2026	1,071,845	0	-137,021	934,824
2027	1,071,099	0	-136,913	934,186

2028	1,070,309	0	-136,800	933,510
2029	1,069,474	0	-136,681	932,792
2030	1,068,589	0	-136,557	932,032
2031	1,067,652	0	-136,426	931,226
2032	1,066,661	0	-136,289	930,372
2033	1,065,613	0	-136,145	929,468
2034	1,064,505	0	-135,994	928,510
2035	1,063,332	0	-135,836	927,496
2036	1,062,093	0	-135,670	926,424
2037	1,060,784	0	-135,495	925,289
2038	1,059,400	0	-135,311	924,089
Total	**31,458,016**	**0**	**-4,999,691**	**26,458,325**

5.7 Climate Change Adaptation Benefits (GL1)

Primary forests in the Congo Basin are not currently as threatened relative 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.

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. 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.

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.

6 COMMUNITY

6.1 Net Positive Community Impacts (CM1)

Objectives to achieve net positive community impacts were identified with respect to intended long-term positive project impacts on baseline community conditions in the project zone. The cause and effect logic behind how these long-term impacts will be achieved are presented in the theory of change model below and reflect the guidance found in the *Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects*.

The baseline scenario for communities in the project zone is one of lack of access to resources from the government, and of a lack of opportunity for gainful employment. Since infrastructure, education, and medical care from the government of the DRC do not penetrate to this region, the communities in the area are forced to rely on their own resources to realize access to basic needs for improved quality of life. The opportunity to make sufficient money to purchase these goods and services in the private market is not present in the zone of the project. Community members are able to realize a livelihood by unsustainable use of the forest resources in the area. Income from those activities is not enough to pay reliably for the schooling, assets to add value to forest products, or medical care necessary to improve quality of life. Ultimately, even that living is unsustainable as the resources of the forest are exhausted. The one employer in the area of the concession only employed 30 persons on a seasonal basis in the baseline, not enough to measurably improve quality of life for the community at large. The baseline scenario for communities in the project area is thus of increasing scarcity of the forest resource on which their living is predicated, and increasing poverty.

In this context, it is clear that Jadora's initiatives in the area, designed as they are to grow human capacity and improve the long-term opportunity for the people in the project area will have a net positive impact. The approach is to realize activities that will create measurable impacts and demonstrate progress to the stated community objectives of the project. This is the theory of change used by the project proponent.

As many objectives overlap, Jadora has developed five broad program areas under which individual project activities will operate. In the short-term, these activities will generate immediate outputs and short to medium-term outcomes, which, over the life of the project will together contribute to achievement of the desired long-term impacts. This theory of change model demonstrates the cause and effect relationship between discrete project activities housed in various program areas and their intended impacts. This demonstration of anticipated causal relationship aligns with good practice guidance for demonstrating how the Isangi REDD+ Project will achieve its stated objectives. The program areas, project activities, indicators, and objectives for the community monitoring plan are detailed in the Annex AU.

Jadora's community-oriented objectives are to:

- Increase access to, relevance, and quality of education to communities in the project zone.
- Improve quality of life and alleviate poverty in project zone by promoting sustainable economic development and agricultural practices and improving public health.
- Maintain the value of resources and ecosystem services that are fundamental to the basic needs of communities in the project zone.
- Support communities in maintaining traditional, cultural, spiritual, and religious identities in the project zone.

Jadora is committed, via the community team leader, to provide positive impacts for all communities in the project area relative to the projected community baseline scenario described in section 4.5.2.

Jadora's community development program focuses on education, improved access to resources, and improved approaches to production and land use planning.

6.1.1.1 Education

Community consultation and Jadora's experience in the project zone indicate a clear lack of educational infrastructure and capacity in the Isangi area. This is evident in the sparse opportunities for primary and secondary education for children, and opportunities for relevant employment and agricultural training for adults. In absence of the REDD+ project, the communities in the project zone would not have the financial resources needed to create and implement pertinent educational initiatives. Education is an essential component to addressing the short- and long-term needs of the communities, as well as in creating permanent and positive climate, community, and biodiversity impacts.

The educational program area functions at a variety of levels to create meaningful project outputs from a suite of project activities. For example a few basic educational project activities range from hiring school teachers to delivering public health information. These activities are independently valuable and directly contribute to the community objectives. Educational activities can also serve as the first phase in implementing activities in other program areas. For instance, in order to increase the agricultural yields (which falls under the production program area), Jadora must first provide training in agricultural practices. In this case, education serves as a stepping stone in attaining other project objectives.

6.1.1.2 Improved access to resources

During the consultation process people living in the project area identified a concern that in the baseline scenario, communities have limited access to resources beyond the basic means of subsistence from adjacent forests, including protein in the form of bushmeat, and the opportunity to clear forest to create temporarily arable land. The current means of utilizing these resources, however, is not sustainable. Also, without the project, people living in the project zone do not have access to improved healthcare or agricultural supplies due to the relatively high cost of these resources in project zone. Communities also have limited means of transportation to sell or buy goods, or a means to finance alternative livelihood generating activities. By increasing access to needed resources Jadora can support the project area communities in pursuing their livelihoods and well-being related objectives, reduce reliance on unsustainable resource exploitation which among other negative impacts result in significant deforestation, and helps to ensure the continued availability of resources to meet basic needs in the future.

The access to resources program area is comprised of three strategies. The first is the provision of supplies and support necessary to implement project activities and help communities meet their basic needs. For example, Jadora will provide seeds for disease and pest resistant varieties of agricultural

staples such as cassava, as well as agroforestry inputs (e.g. nitrogen fixing tree saplings). In doing so, communities can adopt improved agricultural practices that result in a greater and more reliable, more nutritious food supply and reduced reliance on forest conversion. In addition, facilitating access to alternative sources of protein, for example through the establishment of tilapia ponds, will help reduce hunting and trapping related threats to rare or endangered species. Lastly, access to medical supplies will improve health care and contribute to alleviating poverty.

The second strategy for increasing community access to resources is through building and maintaining infrastructure that will provide physical spaces in which to implement project activities (e.g. workspaces, health clinics, radio towers etc.). These spaces provide opportunities for the implementation of additional livelihood activities (e.g. workspace for sewing or fabrication), community centers, and support improved local mobility such as through improved bicycle paths. By allowing communities to become more self-sufficient, reliance on unsustainable use of forest and wildlife resources will be reduced.

Improving access to finance for livelihood activities is the third approach in this program area and acts as an additional catalyst to support activities in all program areas. Microfinance will provide opportunities (previously unavailable) for the start-up of small-scale, individual, family or small group enterprises. Local needs and interests expressed in relation to these types of activities include sewing and metal working, while other examples may include the support of new agricultural practices or small business.

6.1.1.3 Improved Production

Under the baseline scenario, production opportunities for the communities remain restricted to growing traditional low-yielding agricultural crops. While the forest provides land that can be cleared for agricultural purposes, methods such as clear cutting and topsoil burning promote an unsustainable way of maintaining this means of production. This is evident as communities continue to produce less viable crops and need to clear more forest in order to do so. In the absence of the REDD+ project, the communities within the project zone would have more limited financial and educational resources to improve their production processes. Production is a vital constituent to addressing the short- and long-term needs of the communities while simultaneously forming positive climate, community and biodiversity impacts.

The improved production program area contributes outputs through the implementation of a variety of activities such as sustainable intensified agriculture, tilapia farms, and the manufacture of improved cook stoves. Together these activities contribute to realizing community aspirations toward improved availability, reliability and sustainability of food supply as well as increased livelihood opportunities in project zone by creating manufacturing and construction jobs, increasing agricultural yields for farmers, and reducing time spent gathering firewood.

6.1.1.4 Land-Use Planning

The project will help facilitate the implementation of effective land-use planning through a participatory approach which relies on community input. While participatory land-use planning will be open to all village members, Jadora does not intend to disrupt the existing village leadership structure in the project zone. Jadora uses a hybrid approach that encourages participation of under-represented groups such as women and youth along with village leaders, while leaving implementation of the plans to chiefs and village elders.

Through new land-use planning sessions, Jadora will present innovative land-use options including intensified agriculture and fuel wood plantations, incorporating memorialize traditional knowledge, so that cultural traditions (such as spirit forests) are maintained. With both modern and traditional approaches in

mind, land use planning will help to maintain ecosystem services while also upholding the cultural and spiritual identities of the local people.

6.1.2 RISKS OF BENEFITS NOT REACHING POORER COMMUNITY MEMBERS

The 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.

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.

6.1.3 NO NEGATIVE EFFECT ON HIGH CONSERVATION VALUES

Through in-depth on-the-ground data collection and understanding of the project area's 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.

6.1.4 SOCIAL IMPACT ASSESSMENT (SIA)

Jadora is currently collecting data to conduct social impact assessment. Data collection is conducted by the Community Consultation Team (CCT). The methodology used is based on the Social and Biodiversity Impact Assessment (SBIA) Manual for REDD+ Projects (Richards & Panfil, 2011) 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.

6.2 Negative Offsite Stakeholder impacts (CM2)

Impacts outside the area of the project will also be positive. The innovations introduced 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 of the 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 displace people or encourage migration. No unmitigated social or economic impacts are expected from the project.

6.2.1 MITIGATION OF NEGATIVE OFFSITE STAKEHOLDER 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 established grievance processes.

6.3 Exceptional Community Benefits (GL2)

The UNDP puts the Congo one step 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.

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 by-product 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.

6.3.1 COMMUNITY BENEFITS AFFECTING NEGATIVE IMPACTS

7 BIODIVERSITY

7.1 Net Positive Biodiversity Impacts (B1)

The project reduces deforestation in 201,731.5 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.

7.1.1 BIODIVERSITY NET IMPACT

7.1.1.1 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 (which is endemic to North Africa) 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. The veterinarian 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 Annex V). 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 Annex V).

7.1.1.2 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, the team also documents human activity. Hunters and fishermen and their traps, nooses, snares and camps are noted.

In addition to monitoring of fauna in forests, 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.

These two approaches are complementary – an increase in the fauna in the forest combined with a drop in the bush meat available in the market will give a strong signal that the project benefits for fauna are being realized. The desirability of animals for meat and the importance for conservation observed in both

locations will also provide a key indication of success. These data will feedback on the program to make hunting sustainable, and allow the project to prioritize provision of alternative protein sources to people in the project area.

7.1.2 HIGH CONSERVATION VALUES

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.

7.1.3 INVASIVE SPECIES IN PROJECT AREA

The agricultural program will not introduce invasive plant or animal species to 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* (African 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 in the project area: *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.

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.

7.1.4 NON-GMO USAGE

No genetically modified organisms will be used in the project.

7.2 Negative Offsite Biodiversity Impacts (B2)

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.

7.2.1 MITIGATION OF NEGATIVE OFFSITE BIODIVERSITY IMPACTS

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.

There is potential for unmitigated negative offsite biodiversity impacts such as hunting; however, the impacts are anticipated to be minimal as the mobility of hunters between forests controlled by other communities is restricted, and hunter's ability to transport kills from other areas to markets in the project area is restricted by lack of refrigeration and a poor transportation network. 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.

7.3 Exceptional Biodiversity Benefits (GL3)

7.3.1 CRITICALLY ENDANGERED (CR) AND ENDANGERED (EN) SPECIES

Critically endangered species:

The Jadora-Isangi REDD project has historical evidence of forest elephants. 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.

Endangered floral species:

- Afromosia/African Teak (*Pericopsis elata)* – 37 individuals identified in forest inventory
- Tola/Tola-blanc (G*ossweilerodendron balsamiferum)* – 11 individuals identified in forest inventory
- Wenge (*Millettia laurentii)* – 1 individual identified in forest inventory
- Douka (*Tieghemella africana)* – 2 individuals identified in forest inventory

Vulnerable floral species:

- Bosse Clair/Scented Guarea (*Guarea cedrata)* – 21 individuals identified in forest inventory
- Bosse Fonce/Black Guarea (*Guarea thompsonii)* –144 individuals identified in forest inventory
- Dibetou/African Walnut (*Lovoa trichilioides)* – 3 individuals identified in forest inventory
- Doussie bipindensis (*Afzelia bipindensis)* – 2 individuals identified in forest inventory
- Kosipo/Cedar Kokoti (*Entandrophragma candollei)* – 8 individuals identified in forest inventory
- Sapele/Sapelli (*Entandrophragma cylindricu)* – 3 individuals identified in forest inventory
- Sipo/Sipo Mahogany/Utile (*Entandrophragma utile)* – 1 individuals identified in forest inventory
- Tiama (*Entandrophragma angolense)* – 5 individuals identified in forest inventory

By ceasing logging operations in the project area, the project proponent will protect these high conservation value species.

Vulnerable faunal species:

The project has a two vulnerable faunal species that have breeding populations within the project zone, including:

- Dwarf crocodiles (*Osteolaemus tetraspus)*
- African Grey Parrots *(Psittacus.erithacus)*

8 MONITORING

8.1 Description of the Monitoring Plan (CL3, CM3 & B3)

In the context of Jadora's Isangi VCS/CCBA REDD+ project in the DRC, the purpose of the monitoring plan is to measure and record data and indicators used to measure the climate, community, and biodiversity effect of the project compared to the baseline, without project, scenario. The data and information to be collected and origin of the data is enumerated in sections 8.2 and 8.3. Methodologies used to estimate and model values correspond to those proscribed by VM0006 v2.1, and are detailed in sections 4, 5, 6, and 7 of this document. Periodicity of monitoring is enumerated for each parameter in sections 8.2 and 8.3. Roles and responsibilities for monitoring are in section 8.1.1. GHG information management systems are described in section 8.1.2.

The climate impact on the project and other areas will be monitored using remote sensing, permanent plots measuring the carbon content of the forest, and a suite of monitoring strategies to track farming activity within 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.

Jadora will monitor five dimensions of the community's perception of its well-being: human, social, physical, natural, and financial.

Biodiversity impacts of the project will be measured using the key indicators of bushmeat availability in the market, hunting, and faunal abundance of key species in the forest. Change in intact forest will be used as a proxy for floral diversity and for biodiversity in general.

8.1.1 ORGANIZATION

Jadora's organizational structure is divided into the leadership, implementation and oversight, community consultation, biodiversity, and natural resources teams. The CEO is advised by the climate, community, and biodiversity directors. The community, biodiversity, and implementation managers and the forestry and agriculture team leads report to the project manager. The project manager reports to the CEO.

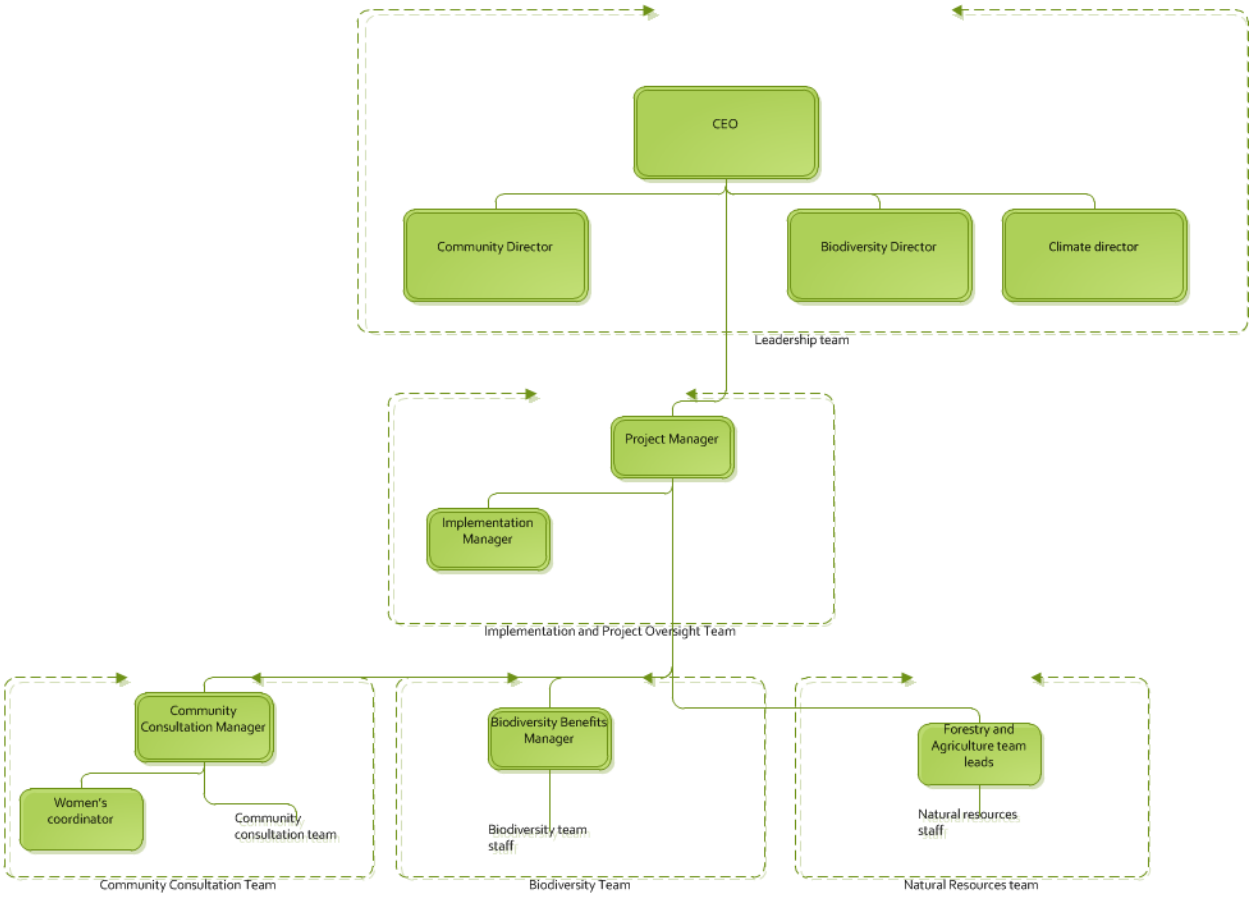

Figure 5. Organizational structure.

The directors of each sector (community, biodiversity, and climate) are responsible for the SOPs, QA/QC and adaptive management of their sector, without directly supervision of the sector managers and team leads.

	Responsibilities	Competencies
CEO	Oversight of the project Direction of the Project manager	
Project manager	Oversight of subordinate teams Review compliance with QA/QC procedures Direct subordinate managers so that monitoring complies with the timeline and budget of the monitoring plan	At least a bachelor's degree or equivalent Experience managing teams Experience working in the same region or country as the project Has a language in common with

		all subordinate managers
Community Consultation manager	Collection of data for parameters related to community monitoring Oversight of the women's coordinator	Literate/numerate Experience in a related field Experience managing teams
Biodiversity benefits manager	Collection of data for parameters related to biodiversity monitoring	Literate/numerate Experience in a related field Experience managing teams
Forestry and Agriculture leads	Collection of data for parameters related to climate monitoring	Literate/numerate Experience in a related field Experience managing teams

Table 33. Roles, responsibilities and competencies for the team leaders and managers implementing monitoring.

8.1.2 DATA

8.1.2.1 Methods for generating data

See sections 8.2 and 8.3 for a description of methods for generating monitored data and parameters.

8.1.2.1.1 Methods for recording data

See sections 8.2 and 8.3 for a description of equipment to be used for recording monitored data and parameters.

8.1.2.1.2 Methods for storing data

Data monitored in sections 8.2 and 8.3 is stored at multiple locations within the United States, in hard and soft copy. The field notebooks are stored at the Jadora office in Seattle, Washington USA, and photocopies are stored at three separate locations. Jadora is currently soliciting bids for cloud (i.e. multiple networked servers in distributed networks) storage and multiple redundant backup of its inventory of biomass, biodiversity and community information collected in the field.

8.1.2.1.3 Methods for aggregating data

See sections 8.2 and 8.3 for a description of methods for aggregating monitored data and parameters.

8.1.2.1.4 Methods for collating data

See sections 8.2 and 8.3 for a description of methods for collating monitored data and parameters.

8.1.2.1.5 Methods for reporting data

See section 8.2 for data and parameters set at validation. Data collected every monitoring period is included in the monitoring report for that period.

8.1.2.2 Management System

Each parameter measured will have an associated measurement SOP for each monitoring period, created by the Director for each sector. If an SOP is adapted from one monitoring period to the next, the documents should be versioned and archived and the monitoring report reference the version and title of the SOP used for that monitoring period. All updates to SOPs shall be approved by the sector director in the leadership team. The project manager is responsible to ensure that all SOPs are adhered to by the team managers.

8.1.2.2.1.1 Internal audits

The team mangers for community, biodiversity and climate are responsible for an internal audit of approximately 10% of the measurements for data and parameters monitored, using a risk-based assessment for selection. If there is a deviation of more than 5% in the measurement and re-measurement of the parameter, the deviation is to be investigated and resolved. When updating plot sheets, data should be crossed out so the original number is legible. When updating data stored electronically, the file should be versioned.

8.1.2.2.2 Quality Assurance and Control

The directors of the Climate, Community, and Biodiversity teams are responsible for creation and adaption of QA/QC protocols as required, and for any technical direction of the project manager or teams. The project manager is responsible to make sure the QA/QC protocols are carried out by the sector managers.

The Jadora field teams minimize error by working as teams to check the identification of tree species and diameter measurements, and community and biodiversity data collected. These teams verify each other's readings. Managers for each team verify a subset of the data recorded using risk-based assessment. The project manager also sample a subset of data recorded on a periodic basis, using a risk-based assessment.

To reduce and eliminate transcriptional error spreadsheets is proofed by re-reading the field notebooks and comparing it to the data that has been entered.

All data will be reported to project proponents and local stakeholders and any discrepancies or disagreements will be rectified by explanation or joint visitation of activities in question. All publically available satellite data used in monitoring, validation, verification and certification will be archived and made available to auditors.

8.1.2.2.3 Field Measurements

All persons involved in the field measurement work will be fully trained to the current measurement SOP before measurements. The dates of training sessions and the persons trained shall be recorded and stored.

The team member names and team leader taking the measurements shall be recorded for each plot measurement.

8.1.2.2.4 Calibration

All measurement and monitoring equipment shall be calibrated per the relevant SOP and the manufacture's manual for that equipment.

8.1.2.2.5 **Data Handling**

Data handling is covered by the data handling and management SOP. Data entered on data sheets shall be archived using redundant electronic copies and in hard copy. All data entry shall be reviewed using a risk-based sampling approach by another party than the person originally doing the data entry. The SOP for each set of measurements shall specify the spreadsheet template used for data collation with a description of the fields for each template.

Data checks shall be performed per the relevant SOP.

Values recorded or estimated shall be compared with those in other comparable areas or in the literature to verify reasonableness.

8.1.2.3 Initial Monitoring Plan

The initial monitoring plan encompasses the requirements and methodologies of ISO 14065-2, the CCBA Standard v2.0, the VCS Standard, AFOLU requirements, and VM0006 v2.1 for a REDD+ project.

Procedures for measurement and calculation of data and parameters monitored are included in sections 8.2 and 8.3.

8.1.2.4 Community

All communities in the project zone (Annex W) will be monitored on a regular, informal basis, overseen by the community consultation manager. 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). Jadora will monitor five dimensions of the community's perception of its well-being: human, social, physical, natural, and financial. As the project proceeds, Jadora will use the input gathered by the CCT to continually adapt and improve the monitoring process and ensure changes to the process have positive impacts on the populations within the project area.

The procedures for community monitoring are detailed in the community monitoring SOP and the community subsection of the data and parameters monitored in sections 8.2 and 8.3, including

- Types of measurements taken
- Frequency of monitoring
- Sampling methodology
- Questionnaire
- Trainings
- QA/QC
- Data entry
- Analysis

Results of the community monitoring will be publically available, published on the internet and disseminated to the communities in the project zone.

The program areas, project activities, indicators, and objectives for the community monitoring plan are detailed in the Annex AU.

8.1.2.5 Biodiversity

Biodiversity impacts are to be monitored both within and without the project. The design of the data and parameters monitored is such that the project will be able to quantify its impact on biodiversity on a regional and local level. The focus of biodiversity monitoring is on CITES-listed fauna, judged to be at high risk and regionally or globally endangered. These are considered to be indicator species (i.e. they provide an indication of the effects of the project's efforts at protecting biodiversity in the project zone).

Three primary foci for monitoring species selected will be

- forest faunal monitoring, meaning counts of animals and their signed in the forest on a per hectare basis
- monitoring of hunting apparatus, monitored on transects and quadrats in the forest
- monitoring of the volume and types bush meat available in local markets.

Periodicity of surveys will be defined by the SOP for biodiversity monitoring. The procedures for monitoring each of the three foci, including types of measurements, training, sampling methods, QA/QC and data analysis are detailed in the biodiversity survey SOP. The data and parameters monitored are in section 8.3.

Floral diversity will be assessed using the proxy of intact canopy cover, monitored as part of climate monitoring.

Results of the surveys will be used in an adaptive framework to evaluate the effectiveness of the project activities in providing a net biodiversity benefit, and the metrics and project activities modified as needed by the sector director.

Results of the biodiversity monitoring will be publically available, published on the internet and disseminated to the communities in the project zone. Records of hunting and related activity may need to be edited before dissemination to preserve anonymity and maintain community relations.

8.1.2.6 Climate

Jadora commits to quantify the net climate benefit of the Isangi project through monitoring according to the methodology prescribed by VM0006 v2.1, including monitoring the required areas using remote sensing techniques and permanent forest plots installed and maintained in the project area.

Selected pools included and excluded in the project scenario and a justification for that decision are as follows:

Included/ excluded	Included/ excluded	Justification
Above-ground tree biomass	Yes	Major Pool
Above-ground non-tree biomass	No	Baseline land use is not perennial tree crop, optional

Below-ground biomass	Yes	Major pool
Litter	No	Excluded per VM0006
Dead Wood	No	Major pool, lying dead wood monitored
Soil	No	Baseline is annual crops, conservative exclusion
Wood Products	Yes	Major Pool affected by project activities

Table 34. Selected pools monitored.

8.1.2.6.1 **Stocks**

8.1.2.6.1.1 Land-use land-cover classification and stratification of the project area

The project, reference, and leakage area are delineated and monitored for LULC and LULC change using remote sensing techniques approved per the requirements of VM006 v2.1 as in sections 5.3, 5.4 and 5.5 of this document and in the remote sensing SOP. Class transitions in all the areas are validated using ground-truthing data. Natural disturbances are monitored and areas severely affected re-classified as necessary.

8.1.2.6.1.2 Emissions factors

Emissions factors based on plot data are used to calculate the net carbon effect of a transition between LULC. Emission factors for above-ground biomass are calculated per VM0006 v2.1.

8.1.2.6.1.3 Field Inventory

8.1.2.6.1.3.1 Sampling plot size and layout rationale

Five hundred and forty (540) permanent plots are located in the forested strata (Annex X) of the Isangi Territory, Democratic Republic of Congo. The sample size 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. Plots were allocated on a grid with a random start point. The location of each of the allocated points were used as the plot center and located by field teams using GPS units with pre-programmed coordinates.

8.1.2.6.1.3.2 Summary of the standard operations procedure for field sampling

Procedures for measurement of the forest carbon plots are given in the climate and forest measurement SOP. They are summarized here:

Teams of Congolese foresters are 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). Each team consists of fifteen men. The teams are given predetermined permanent plots to measure before each excursion.

8.1.2.6.2 Emissions

Emissions inside and outside the project will be monitored and documented using the procedures prescribed by VM0006, i.e. using remote sensing of LULC tied to emissions factors for the selected pools in the project boundary.

Non-CO_2 emissions from burning are conservatively excluded from the accounting and monitoring.

8.1.2.6.3 Leakage

Leakage monitoring will occur in the leakage belt per the procedures prescribed by VM0006 v2.1 for at least five years after the end of the project lifetime.

8.1.2.7 Reporting

A GHG report will be prepared every monitoring period, intended to summarize evidence of the net project benefit for the selected VCS/CBBA auditor.

8.1.2.7.1 Frequency

Jadora will track both the rate of deforestation and changes in LULC every monitoring period. 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.

8.1.2.7.2 Dissemination

Monitoring reports will be made publically available on the VCS website. Results of monitoring will also be communicated in an appropriate language and format to the communities and stakeholders in the project zone.

8.2 Data and Parameters Available at Validation (CL3)

Data/parameter [EA1]:	CF
Data unit:	[Mg C (Mg DM)$^{-1}$]
Description:	Carbon fraction of dry matter in wood
Sources of data:	Default value of 0.5 (IPCC GPG-LULUCF 2003)
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied:	According to the IPCC, the default value of 0.5 Mg C (Mg DM)^-1 is applicable for all three tiers when remaining forest land, forest land or biomass carbon is a key or non-key category.
Any comment:	

Data/parameter [EA2]:	E
Data unit:	[-]
Description:	Average combustion efficiency of the aboveground tree biomass
Sources of data (*):	Project-specific measurements Regionally valid estimates Estimates from Table 3.A.14 of IPCC GPG LULUCF If no appropriate combustion efficiency can be used, use the IPCC default of 0.5
Value applied:	0.3
Justification of choice of data or description of measurement methods and procedures applied:	IPCC 2006 gives this value for tropical moist primary forest types.
Any comment:	The value of 0.40 is provided as an average combustion efficient for aboveground tree biomass in tropical moist secondary forests.

Data/parameter [EA3]:	P
Data unit:	[-]
Description:	Average proportion of mass burned from the aboveground tree biomass.
Sources of data:	GPG-LULUCF Table 3A.1.13
Value applied:	83.9
Justification of choice of data or description of measurement methods and procedures applied:	83.9 is the mean provided by the IPCC for the average proportion of mass burned from the aboveground tree biomass in primary tropical forests which is the forest type the project for the most part, aligns with.
Any comment:	For secondary tropical forests, 8.1 is provided as an average

	value for young secondary tropical forests, 41.1 for intermediate secondary tropical forests, and 46.4 for advanced secondary tropical forests. These are provided here because some of growth within the project area is secondary but as a majority, it is still primary forest.

Data/parameter [EA4]:	GWP_{CH4}
Data unit:	[-]
Description:	Global Warming Potential for CH_4
Sources of data:	IPCC default value of 25
Value applied:	25
Justification of choice of data or description of measurement methods and procedures applied:	IPCC 2007 Fourth Assessment Report: Climate Change 2007 states that over a 100 year time horizon, the GWP for CH4 is 25.
Any comment:	

Data/parameter [EA5]:	ER_{CH4}
Data unit:	Proportion
Description:	Emission ratios for CH_4
Sources of data:	Table 3A.1.15 in IPCC GPG-LULUCF 2003
Value applied:	0.012
Justification of choice of data or description of measurement methods and procedures applied:	IPCC default value of 0.012 provided.
Any comment:	(0.009-0.015) Delmas, 1993 asterisked in IPCC table

Data/parameter [EA6]:	sc_1
Data unit:	[-]
Description:	First shape factor for the forest scarcity equation; steepness of the decrease in deforestation rate (greater is steeper).
Sources of data:	Statistical fitting procedure. Using remotely sensed forest cover data in heavily deforested areas close to the project area such as neighboring provinces, states or countries
Value applied:	-6.6
Justification of choice of data or description of measurement methods and procedures applied:	Use procedure from VM0006 v2.1
Any comment:	

Data/parameter [EA7]:	sc_2
Data unit:	[-]
Description:	Second shape factor for the forest scarcity equation; relative deforested area at which the deforestation rate will be 50% of the initial deforestation rate.
Sources of data:	Statistical fitting procedure. Using remotely sensed forest cover data in heavily deforested areas close to the project area such as neighboring provinces, states or countries
Value applied:	0.83
Justification of choice of data or description of measurement methods and procedures applied:	Use procedure from VM0006 v2.0
Any comment:	

Data/parameter [EA8]:	$wwf(ty)$
Data unit:	[-]
Description:	Fraction of carbon in harvested wood products that are emitted immediately because of mill inefficiency for wood class ty. This can be estimated by multiplying the applicable fraction to the total amount of carbon in different harvested wood product category.
Sources of data:	The default applicable fraction is 24% and 19% respectively for developing and developed countries (Winjum et al. 1998).
Value applied:	24%
Justification of choice of data or description of measurement methods and procedures applied:	Winjum et al. 1998 states that the default fraction is 24% for developing countries.
Any comment:	Any new updates from locally generated results can be used instead of the default values.

Data/parameter [EA9]:	$slp(ty)$
Data unit:	[-]
Description:	Proportion of short lived products
Sources of data:	Default values are 0.2, 0.1, 0.4 and 0.3 respectively for wood class ty, i.e., sawnwood, wood-based panel, paper and paper boards and other industrial round woods as described in Winjum et al. (1998).
Value applied:	0.2, 0.1, 0.4, 0.3
Justification of choice of data or description of measurement methods and procedures applied:	Winjum et al. provides the above values for sawnwood, wood-based panel, paper/paper boards and industrial roundwood

Any comment:	Any new updates from locally generated results can be used instead of the default values. The methodology assumes that all other classes of wood products are emitted within 5 years.

Data/parameter [EA10]:	$fo(ty)$
Data unit:	[-]
Description:	Fraction of carbon that will be emitted to the atmosphere between 5 and 100 years of harvest for wood class ty.
Sources of data:	See (Winjum et al. 1998).
Value applied:	0.84, 0.97, 0.99, 0.99
Justification of choice of data or description of measurement methods and procedures applied:	Winjum et al. provides these values for the fraction of carbon that will be emitted into the atmosphere between 5 and 100 years after harvest for tropical wood classes.
Any comment:	Any new updates from locally generated results can be used instead of the default values.

Data/parameter [EA11]:	$\rho_{wood,j}$
Data unit:	[Mg DM m^{-3}]
Description:	Average basic wood density of species or species group j
Sources of data:	GPG-LULUCF Table 3A.1.9. or published data/literature.
Value applied:	See section 5.3.4, emissions factors, for the vector of densities used
Justification of choice of data or description of measurement methods and procedures applied:	IPCC table 3A. 1.9-2 provides average basic wood densities for multiple species in tropical Africa.
Any comment:	

Data/parameter [EA12]:	BEF_2
Data unit:	[-]
Description:	Biomass expansion factor for converting volumes of extracted round wood to total aboveground biomass (including bark).
Sources of data:	IPCC GPG LULUCF Table 3A.1.10 or published data from

	scientific peer reviewed literature
Value applied:	Broadleaf = 3.4 (2.0 – 9.0)
Justification of choice of data or description of measurement methods and procedures applied:	BEF2 value for tropical broadleaf trees values according to IPPCC LULICF table 3A.1.10.
Any comment:	

Data/parameter [EA13]:	$EF_{rice,max}$
Data unit:	[kg CH_4 ha^{-1} day^{-1}]
Description:	Maximal emission factor for methane
Sources of data:	By default, an emission rate of 36 kg CH4 ha^{-1} day^{-1} must be used, which is 25% greater than the maximal value found in a review study comparing 23 studies of CH4 fluxes in rice fields (Le Mer and Roger, 2001). Project proponents may use a smaller emission rate if it can be demonstrated from empirical data or other supporting information such as published data that the rate remains conservative for the project conditions.
Value applied:	36
Justification of choice of data or description of measurement methods and procedures applied:	Default provided by Le Mer and Roger, 2001.
Any comment:	Only to be included if rice production is increased as a leakage prevention measure.

Data/parameter [EA14]:	$NCV_{biomass}$
Data unit:	[TJ (Mg DM) $^{-1}$]
Description:	Net calorific value of non-renewable biomass that is substituted.
Sources of data:	0.015 TJ (Mg DM) $^{-1}$ IPCC default value.
Value applied:	0.015
Justification of choice of data or description of measurement methods and procedures applied:	IPCC default provided
Any comment:	

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