PROJECT DESIGN DOCUMENT FORM FOR SAFEGUARD AND CONSERVATION OF FOREST PROJECT ACTIVITIES

CONTENTS

Annexes

SECTION A. General description of the proposed project activity:

A.1. Title of the proposed project activity:

Carbon sequestration calculation in the Samboko-Ituri Forest (Democratic Republic of Congo).
Version 7, 27/05/2008.

A.2. Description of the proposed project activity:

The present project aims to preserve an area of approximately 90,000 ha in the Samboko-Ituri Forest (Democratic Republic of Congo). The Proponent of the Project, a Congolese company named Planète sprl, has borrowed the area in order to make business through timber trading. But, if it is possible to have a business with the safeguard of forest and, successively, the opportunity to earn money from the market of VERs, it will be possible not to make deforestation and, on the other hand, to preserve the forest. Moreover, this protection activity will be carry out by the Proponent of the Project through the improvement of the forest boundaries, the hiring and training of appropriate personnel, a monitoring activity, and the implementation of the trading of local products (such as palm oil, coffee and honey) in order to also avoid illegal deforestation activity by local human communities living in the area. Finally, the purpose of the project is also to avoid deforestation with small-scale reforestation activities in order to restore illegal logging. Eco-sustainable activities will be implemented by the above mentioned local human communities. All this project activities will be possible exclusively by means of funds deriving from Carbon Finance.

A.3. Project participants:

Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be indicated using the following tabular format.

Name of Party involved ((host) indicates a host Party)	**Private and/or public entity(ies) project participants (*) (as applicable)**	**Indicate if the Party involved wishes to be considered as a project participant (Yes/No)**
Democratic Republic of Congo (host)	• Planète sprl	Yes

A.4. Description of location and boundary of the project activity:

The site of project is situated in the *Province Orientale* of the Democratic Republic of Congo (DRC), next to the north-east boundary of the country. In particular, it is localised on Samboko-Ituri territory: from Luna to 40 km west, from the main highway to Komanda.

A.4.1. Location of the proposed project activity:

A.4.1.1. Host Party(ies):

Democratic Republic of Congo (DRC)

A.4.1.2. Region/State/Province etc.:

Province Orientale

A.4.1.3. City/Town/Community etc:

Groupement de Vandavilemba, *Collectivité de Walese-Vokutu*, *Territoire d'Irimu*

A.4.2. Detail of geographical location and project boundary, including information allowing the unique identification(s) of the proposed project activity:

The site of project is situated in the *Province Orientale* (former *Haute Province*) of the Democratic Republic of Congo (DRC), next to north-east boundary of country. In particular it is localised amongst these villages or little towns: Mambasa, Bunia and Beni. The site is also localised in the south-east side of Ituri's external boundary. The geographical coordinates are: 0°59'43.23" N – 29°21'11.20" E for the bottom-left corner point of site, and 1°18'01.89" N – 29°46'53.69" E for its top-right corner point.

The following figures will describe the site localization from very low details to very high ones. They will show the grid zoning dividing the site surface in equivalent exploitation zones.

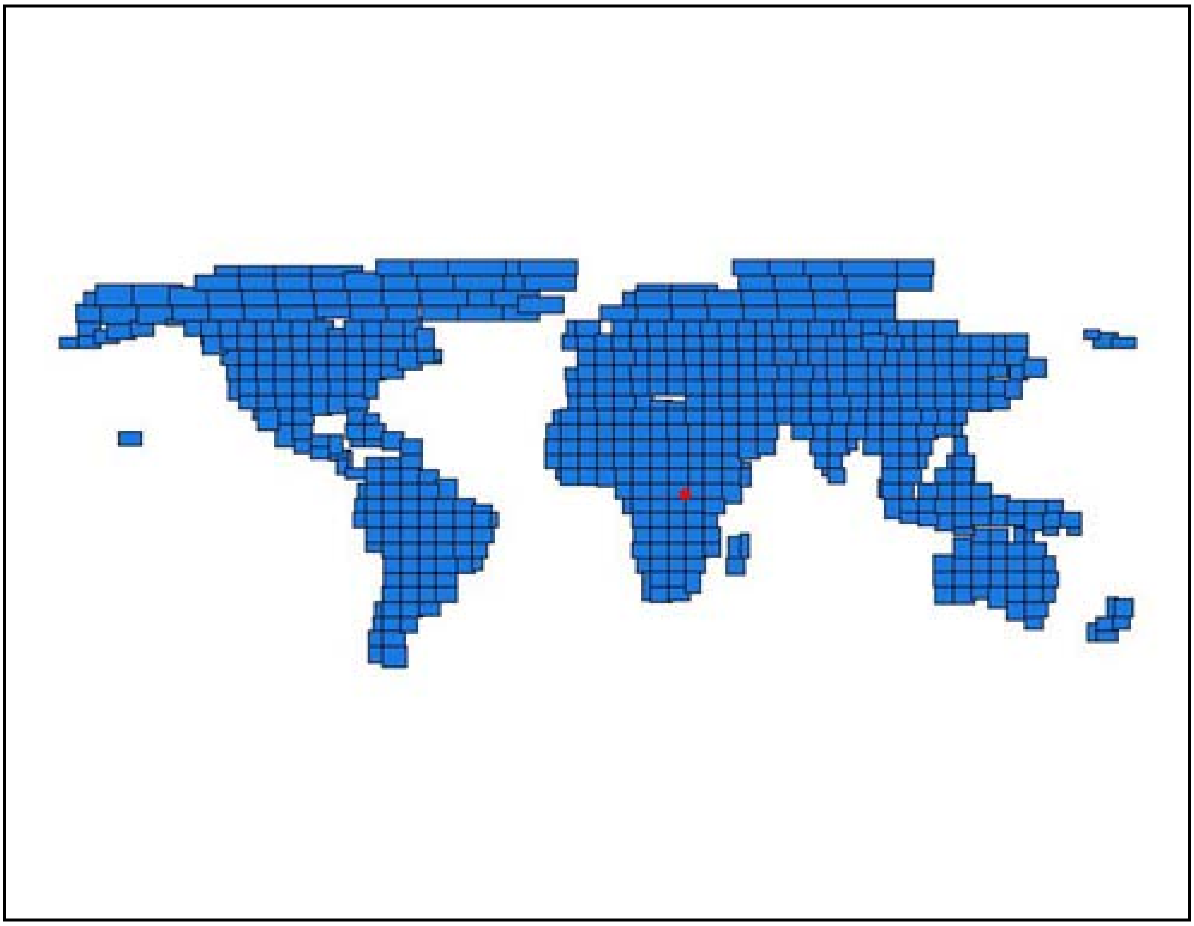

Figure A-1a shows the localization of the project site on a world view. An ArcView's projection (geographical projection in decimal degrees – datum WGS 84). In this figure the UTM projection and its cartographic zoning are represented.

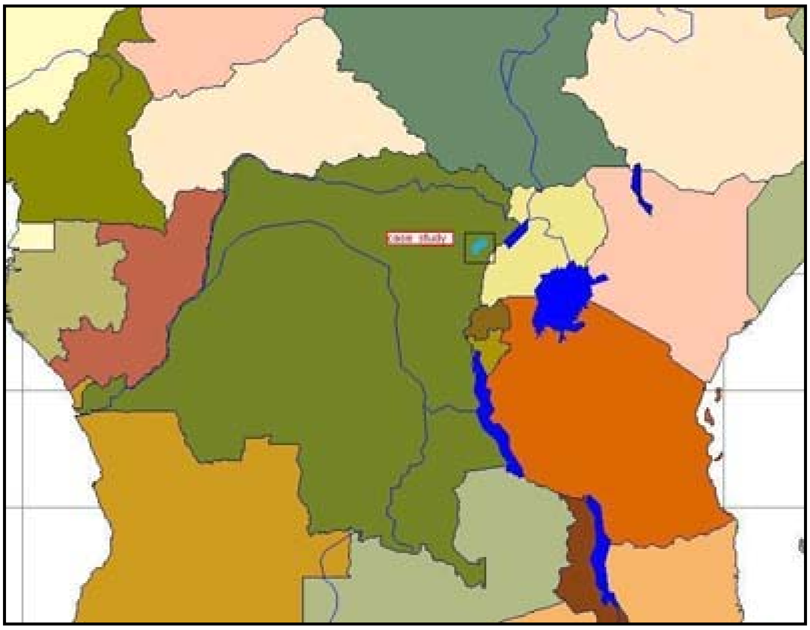

Figure A-1b shows the localization of the project site in the Democratic Republic of Congo (DRC). An ArcView's projection (geographical projection in decimal degrees – datum WGS 84).

Figure A-1c shows the administrative map of the Democratic Republic of Congo (DRC).

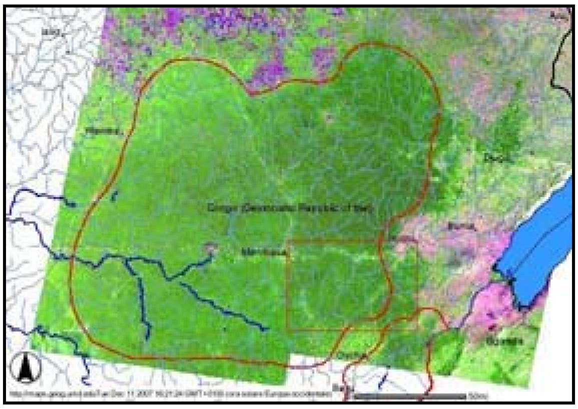

Figure A-1d shows the localization of the project site in the Ituri region (www.carpe.umd.edu).

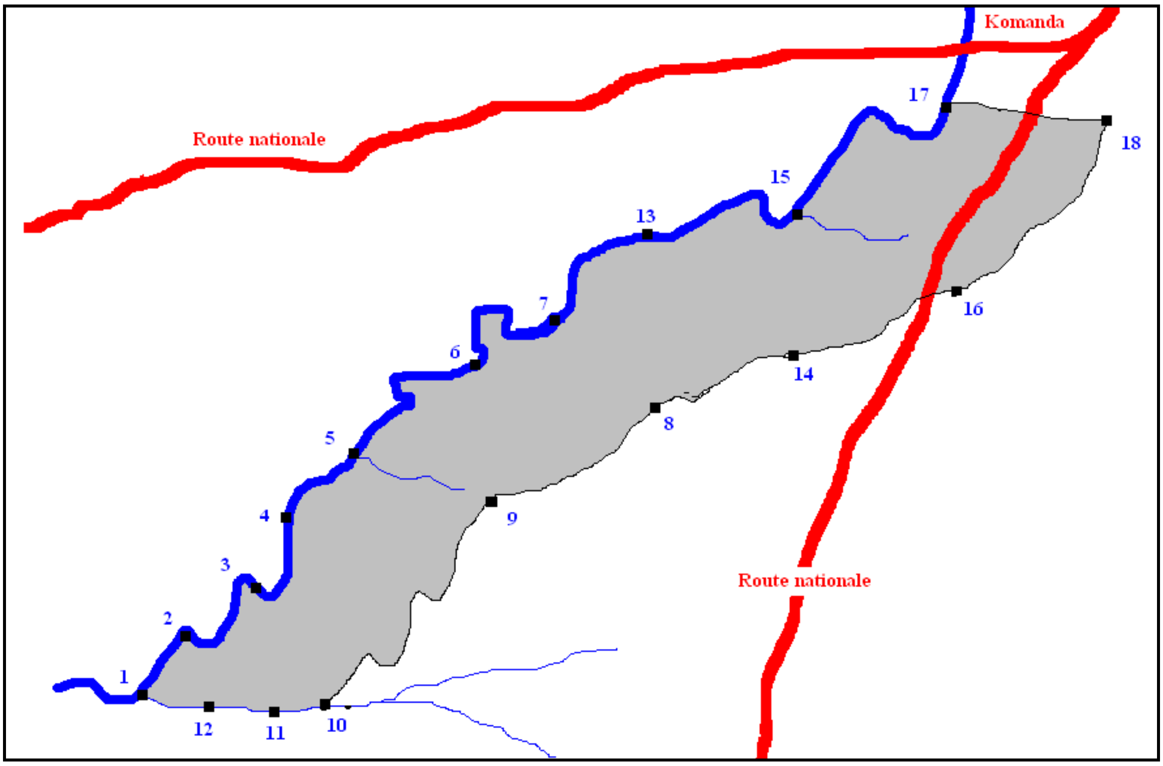

Figure A-1e shows the site of project with specified the following geographical coordinates:1) 0° 59’43.23’’ N - 29° 21’11.20’’ E; 2) 1° 02’20.86’’ N - 29° 22’03.38’’ E; 3) 1° 05’04.55’’ N - 29° 22’15.32’’ E; 4) 1° 08’10.00’’ N - 29° 23’38.42’’ E; 5) 1° 10’53.62’’ N - 29° 26’27.83’’ E; 6) 1° 13’47.20’’ N - 29° 31’20.81’’ E; 7) 1° 14’52.50’’ N - 29° 35’18.43’’ E; 8) 1° 11’06.69’’ N 29° 34’29.17’’ E; 9) 1° 07’08.10’’ N - 29° 7’14056’’ E; 10) 0° 57’47.04’’ N - 29° 24’38.69’’ E; 11) 0° 59’00.99’’ N - 29° 23’46.06’’ E; 12) 0° 58’48.34’’ N - 29° 21’48.68’’ E; 13) 1° 16’37.27’’ N - 29° 38’49.79’’ E; 14) 1° 15’08.10’’ N - 29° 42’30.42’’ E; 15) 1° 17’12.33’’ N - 29° 41’03.55’’ E; 16) 1° 14’57.86’’ N - 29° 44’25.07’’ E; 17) 1° 20’10.17’’ N - 29° 42’28.27’’ E.; 18) 1° 18’01.89’’ N - 29° 46’5369’’ E.

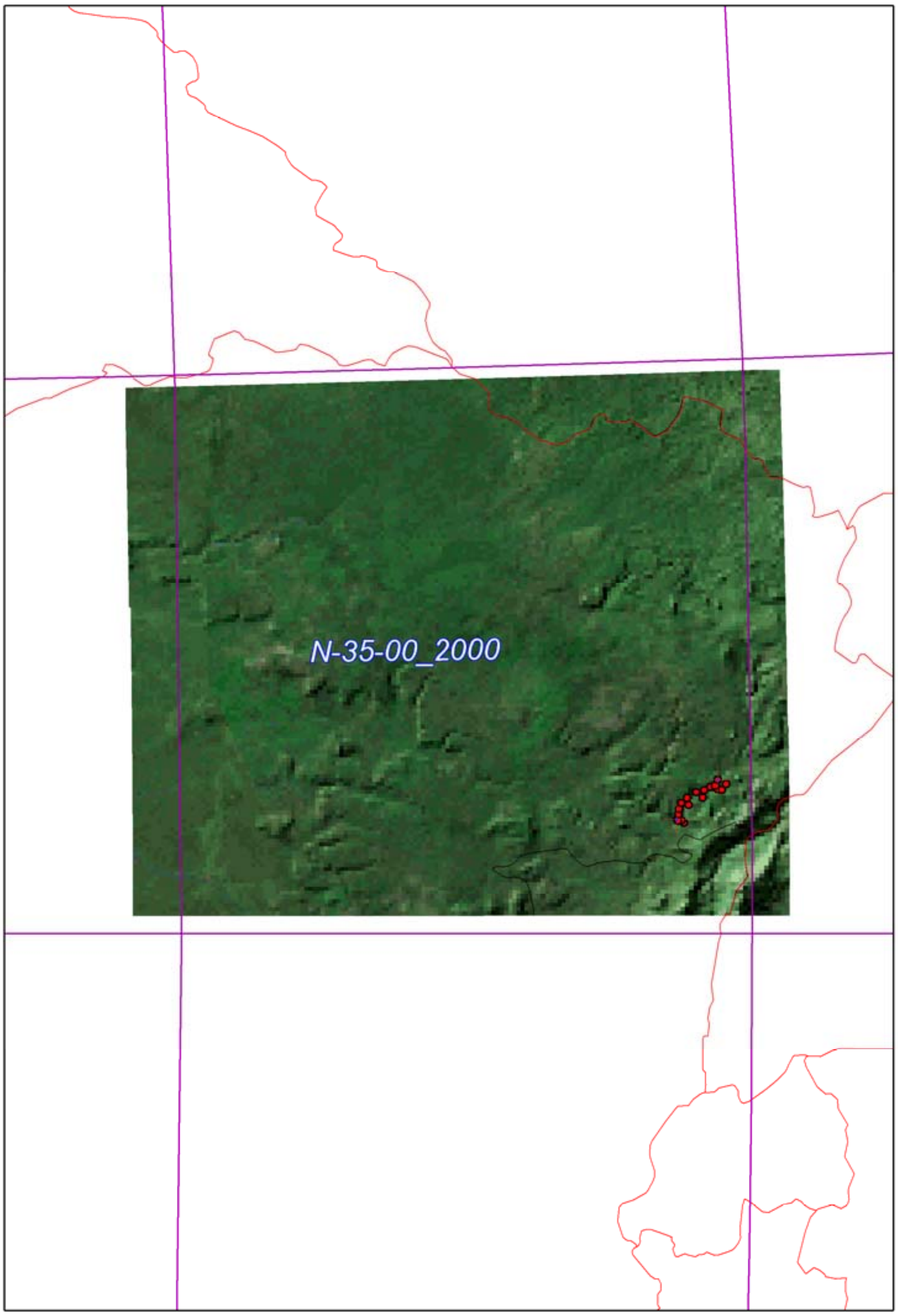

Figure A-1f shows the localization of the site involved following a georeferencing procedure of Landsat 7 2000 NASA image. The site, highlighted in red points, falls into the 35 North Zone of UTM Projection with datum WGS 85.

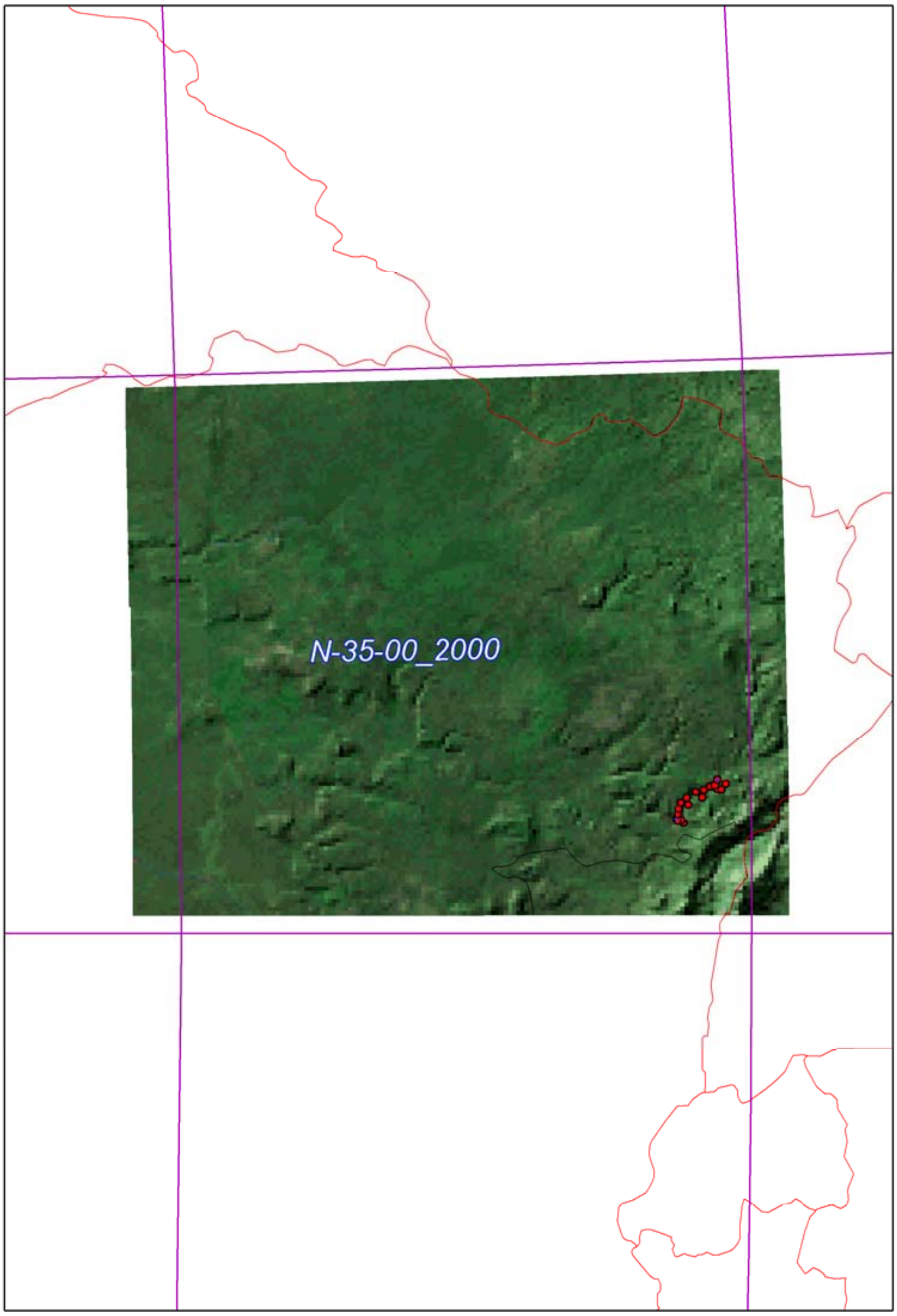

Figure A-1g shows the localization of the project site, highlighted in red points, following a georeferencing procedure of Landsat image by Google /NASA Map data 2007.

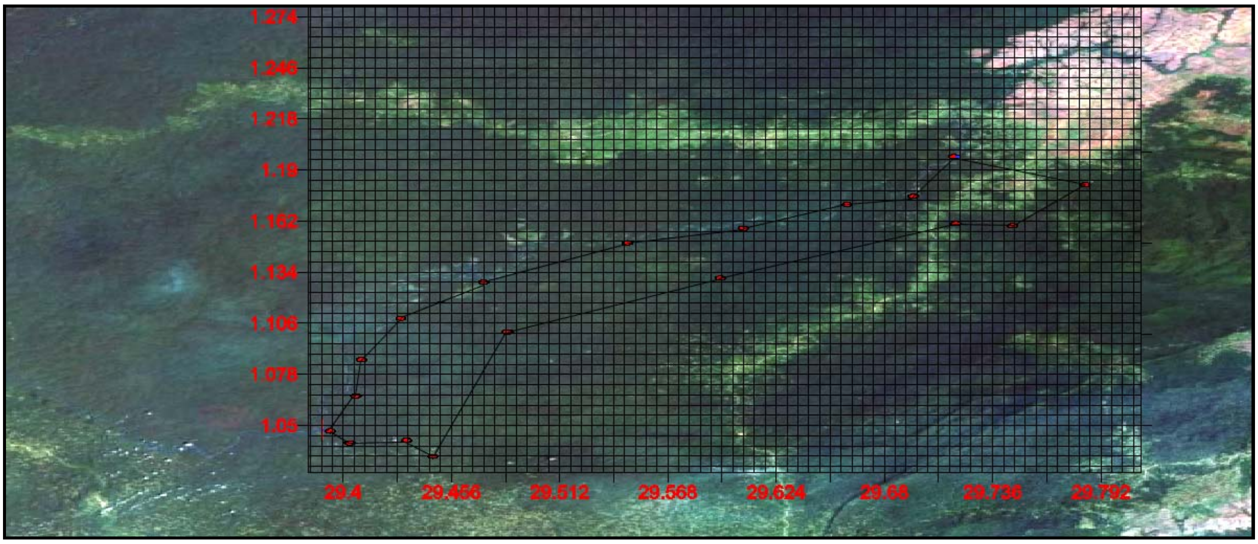

Figure A-1h shows the localization of the project site, in red points, following a georeferencing procedure of Landsat image by Google /NASA Map data 2007. Each zone is a square with approximately 1.58 km x 1.58 km side, that is a quarter of the Standard Unit of 1,000 ha. The coordinates are decimal degrees.

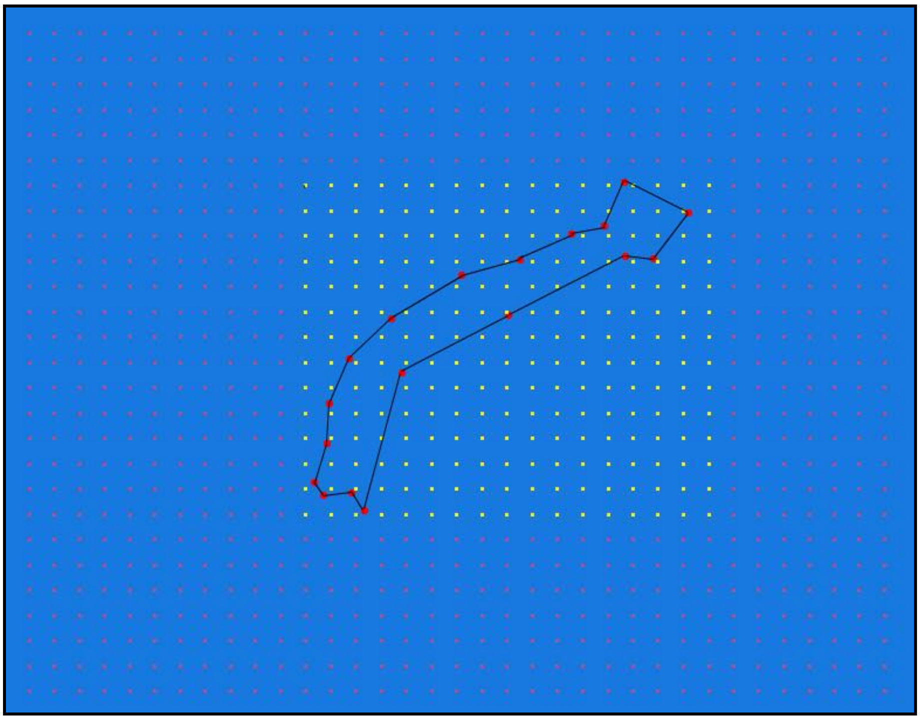

Figure A-1i shows the grid zoning on project site, projected on ArcView's projection (geographical projection in decimal degrees – datum WGS 84). Grid zoning with 0.0287273 degree spacing for latitude and longitude. The coordinates are decimal degrees.

A.5. Technical description of the project activity:

A.5.1. Type(s) of project activity:

Safeguard and conservation of the forest.

A.5.2. A concise description of present environmental conditions of the area, which include information on climate, soils, main watershed, ecosystems, and the possible presence of rare or endangered species and their habitats:

The climate is characterized by an average daily temperature that varies between 23°C and 25.5 °C. Rainfall is bimodal, with rainy seasons centred on the equinoxes and dry periods centred on the solstices. Inter-annual variations can be considerable and are partly linked to the variability of the passing of inter-tropical convergence. Rains often beat down during storms and are mainly caused by the climatic system of the Congo Basin. The monsoon effects of the Indian Ocean are not known, but that the region's climate seems to be influenced by dynamics outside the Congo Basin, leading to suppose that it could undergo rapid changes. The average annual rainfall is about 1,600 - 2,000 mm. The driest period month is January, the only time when the average rainfall dips below 50 mm in some parts of territory. During the dry season, the sky is completely cloudness; humidity is low and evaporation very high. Even in dense forest, water losses are substantial. In some years, these dry periods are particularly long.
The hydrology of this territory takes part in the big Congo Basin and in its hydrographical network. The rivers, generally, have moderate high waters with the maximum reached between September and November. After heavy rains, the small watercourses undergo brief high waters which disturb their beds and take away debris. Flood plains are rare and limited to the largest rivers in the west. The heads of numerous streams have poorly drained areas that create dendriform networks of marshy environments (CARPE, 2007). An important river in the territory is the Ituri River. Its alluvium load, which has its origin in the extensively logged areas in the east, has increased appreciably over the last decades.
Generally, the large territory where the CS is situated, consists of a slightly undulating peneplain at an altitude of 700 to 900 m, but rising up to 1,000 in the east. The mostly gentle relief is punctuated by low massifs covering 20 km^2 or more and rising from 50 to 300 m above the peneplain along old fracture line in the Gondwanian shield. These massifs join to form a spectacular chain of granite inselbergs exposing large stretches of naked rock (CARPE, 2007).
The soils are mostly derived from degraded granite and quartzite of the Gondwanian shield. The soil ranges from red oxysol, fine and highly degraded, to yellow or brown sandy clay. Alluvium deposits occupy the banks of the watercourses and poorly drained basins of the heads of numerous rivers. The soils are generally very acid and this acidity is associated with low fertility, as well as a shortage of available nitrogen and phosphorus. More fertile areas exist, particularly in association with red oxysol (CARPE, 2007).
From the ecological point of view, the CS can be considered as an external part of the near Ituri Forest and more in general as a part of the Central Congolese Lowland Forest (CCLF) (WWF, 2001). The Ituri Forest in fact is like an icon of the Central Africa's biodiversity, containing an exceptionally rich bird and mammal fauna, including major populations of the endemic okapi (Okapi Faunal Reserve in the Ituri Forest).

Flora biodiversity value. The forestal vegetation is classifiable as tropical rainforest ecological zone and more in particular as Moist Dense Forest (MDF). The principal botanical species of Moist Dense Forest (MDF) in the Congo Basin (Guineo-Congolese domain) are: *Gilbertiodendron dewevrei, Gilbertiodendron ogoouense, Julbernardia seretii* and *Brachystegia laurentii* at the upper stratum. There are also other typical plants: *Diospyros spp., Diogoa zenkeri, Heisteria parvifolia, Isolona thonneri, Polyalthia suaveolens, Staudtia stipitata* and *Cynometra alexandri*.

In the flat areas, swamp forests are present along the rivers. The sequential development of wetland vegetation in the Congo River Basin once present along shallow, sheltered lake shores differed from the vegetation along the river that follows seasonal flood regime. The sedge, *Eleocharis plantaginea* emerged from the deep water beyond the plants forming "floating islands". In the past aquatic grasses dominated the floodplain. (Thompson, 1985). So, such formations are influenced by the presence of frequent floods and soil with insufficient drainage. Flooding frequency and drainage conditions of soil generate different kinds of forest: riparian forest, periodically inundated forests, permanently inundated forests. Due to the density of hydrographical network, the swamp forests cover a large area in the centre of Congo Basin, while the evergreen tropical forest is located only in interfluves. Swamp forests are characterised by the presence of *Hallea stipulosa*, *Uapaca guineensis* and localised dominances of *Raphia sp*. Lianas are abundant. Generally, the swamp forest is also represented by forest fringe which marks the transition between pioneer shrub communities and swamp or periodically flooded forests, and contains such species as *Uapaca heudelotii*, *Cleistopholis patens*, *Ficus mucuso*, *Lannea welwitschii*, *Oxystigma buccholzii*, *Pseudospondias microcarpa* and *Spondianthus preussi* (Sébastien et al., 2001).

The *Gilbertiodendron dewevrei,* the most representative species, is found in Periodically Inundated Swamps Forest (PISF) together with *Oxystigma oxyphyllum* and *Scorodophloeus zenkeri*, two mesophyle species. The species of Gilbertiodendretalia - Dewevrei order by Lebrun & Gilbert (1954) are the followings: *Diogoa zenkeri, Diospyrus spp., Gilbertiodendron ogounse, Heisteria parvifolia, Isolona thonneri, Maba spp., Pavetta tetramera, Polyalthia suaveolens, Psychotria brevipaninculata, Schotia romii* and *Staudia stipitata.*

Formations like semi-deciduous forest of Congo Basin represent a sub-type of MDF. In fact, the subequatorial and Guinean semi-deciduous forests are found inside or on the edges of the MDF: here, typical species include *Leguminosae* such as *Pericopsis elata*, *Copaifera soyauxii*, *Dialium spp.*, *Gossweilerodendron balsamiferum*, *Oxystima oxyphyllum* and *Scorodophoeus zenkeri*. There are the genera *Celtis spp.* and *Meliaceae* such as *Entandrophragma angolese*, *Guarea cedrata* and *Guarea thompsonii* (Sébastien et al., 2001).

On the dry slopes, there are semi-deciduous forests whose canopies contain more light-demanding species, such as *Entandrophragma spp.*, *Khaya anthotheca*, *Albizia spp.* and *Canarium schweinfurthii* (CARPE, 2007). Semi-deciduous forests can also cover areas between the major river systems, and are characterized by *Staudtia stipitata*, *Polyalthia suavaeoleus*, *Scorodophloeus zenkeri*, *Anonidium mannii* and *Parinari glaberrimum*. Usually, the upper layer of the young secondary formation is continuous and homogeneous, and is often characterized by a mono-specific composition of *Musanga cecropioides*. This pioneer species, strictly heliophyte, shows a rapid height growth in the clearing zone: up to 15 m in 3 yrs (Mayaux et. al., 1999). Secondary forest of varying age is only partly caused by natural factors. Violent storms effectively tear large holes in the forest and a mosaic of primary and secondary forest develops. Secondary forests are also the result of human activities: shifting agriculture and logging. On the shallow and rocky soils on the granite inselberg there are highly specialized xerophile plant formations comprising many species of plants that have a limited distribution and are of global importance for conservation. There are also clearings, locally called "edo", which are maintained by the local fauna. The size of this clearing varies from less that a hectare to several hectares. They are recolonized by forest when the influence of fauna disappears (CARPE, 2007). In the Ituri's flora the main threatened species are: *Enclephalartos ituriensis*, *Enclephalartos septentrionalis*, *Euphorbia bwambensis*, *Euphorbia venenifica* and *Euphorbia teke*.

Fauna biodiversity value. In terms of fauna the CCLF ecoregion scientists are just beginning to understand and document the complexity and distributions of species (Thompson 2001, 2003). Vertebrate species richness and endemism levels in this forest area are markedly lower than in other moist forest ecoregions of the Congo Basin. This may be misleading and due to under-collecting within the area, although formidable riverine barriers to the north, east, and west may have prevented interchange of widespread vertebrate species from outside the ecoregion (e.g. *Cephalophus leucogaster* and *Neotragus batesi*) (Grubb 2001). The relatively low levels of species richness and endemism may also reflect recent climatic history. Maley (1991, 1994, 2001) and others indicate that forest may have been lost from these areas during the last million years, probably in association with ice ages, which resulted in dry periods in Africa. From the little knowledge available, it seems that the density of large mammal species is also naturally lower in this ecoregion than in other parts of the Congo Basin (Alers *et al*. 1992, Krunkelsven *et al*. 2000, Malenky *et al*. 1989).

Heavy hunting has also lowered the population densities of forest elephants (*Loxodonta africanus cyclotis*) (Alers *et al*. 1992). However, the Central Congolese Lowland Forests ecoregion houses a number of important mammal populations (AECCG 1991). However, because this region is so poorly surveyed, the information on species numbers and endemics should be viewed as incomplete. Our knowledge about the fauna comes from the near Ituri Forest. This is home to thirteen species of diurnal primates and six species of duiker. There are some species with a limited or almost endemic to the DRC: the okapi (*Okapia johnstoni*), the aquatic genet (*Genetta victoriae*) and Hamlyn's monkey (*Cercopithecus hamlyni*). It has also a large population of globally threatened species, such as the forest elephant and the chimpanzee (*Pan troglodytes*).Other important species are the Hoest's monkey (*Cercopithecus lhoesti*), the leopard (*Panthera pardus*), the Cape buffalo (*Syncerus caffer nanus*), the bongo (*Tragelaphus euryceros*), the sitatunga (*Tragelaphus spekei*), the African golden cat (*Felix aurata*), the giant forest hog (*Hylochoerus meinertzhageni*), the red river hog (*Potamochoerus porcus*), the water chevrotain (*Hyemoschus aquaticus*) and the forest aardvark (*Orycteropus afer eriksonni*). Dyboswki's meerkat (*Dologale dybowski*) is a species living at the edge of forest, which was recently collected. The forest-savannah mosaic could contain specialized fauna that is rare or absent in other parts of the Congo Basin and absent from the more arid regions to the east and the north (CARPE, 2007).

There are no known strict endemic species among the avifauna, but two species represent near-endemics with restricted ranges. These are the Congo peacock (*Afropavo congensis*, VU) and the yellow-legged malimbe (*Malimbus flavipes*) (Thompson 1996). The known herpetofauna also shows low rates of endemism. One amphibian is strictly endemic to the ecoregion, the Gembe reed frog (*Hyperolius robustus*), and another is nearly endemic, the Lomami screeching frog (*Arthroleptis phyrynoides*). There are no strictly endemic reptiles, but near-endemic reptiles include Vanderyst's work lizard (*Monopeltis vanderysti*), *Gastropholis tropidopholis, Mehelya laurenti, Polemon robustus* and *Zygaspis dolichomenta*. This ecoregion also offers critical habitat to the African slender-snouted crocodile (*Crocodylus cataphractus*). As with the mammals and birds it is very likely that further survey work in this ecoregion will discover additional species of amphibians and reptiles that are either strictly or nearly endemic to the ecoregion. Another important biodiversity indicator is represented by fish species.

The Congo River Basin is second only to the Amazon Basin in species richness: 25 families and 686 fish species have been reliably reported, including approximately 548 endemic species. The Ituri River and its tributaries contain an ichthyofauna that is still largely unknown. It is locally fished, although not at an intensive level currently. Given the fact that the Ituri Basin is well upstream in the Congo Basin, its fauna is not as rich as in central basin. Furthermore, some major rapids on the middle course of Ituri create a biogeographical barrier which isolates this river from the Congo River. Preliminary inventories carried out at the beginning of the 1980s showed that the ichthyofauna consisted primarily of generalist species that were usually widely distributed; it also included some species that have not yet been found elsewhere and specialist species such as rock browser, which live in torrents and are likely to be endemic in Ituri

Basin. Some of these species were unknown to local fishermen whose methods are inappropriate for catching these specialist species (CARPE, 2007).
In the Ituri's fauna the main threatened species are: forest elephant, okapi, owl-faced monkey, fishing genet, white-bellied duiker and golden-naped weaver (CARPE, 2007).

Human influence. Cuts of stone tools found at the eastern edge of the Ituri forested area indicate human presence in the Middle Stone Age. It is not certain if the region was covered in forests at that time. Recent excavations in sheltered areas under rocks in the north show that a few millennia ago the forest was inhabited, but played only a minor role in the development of human cultures, particularly in the expansion of iron-working. When the first European arrived at the end of 19^{th} century and the first documents were written, the forest of Upper Ituri contained only small scattered villages and vast areas were not inhabited on permanent basis. The human population increased during the colonial period, following the opening-up of the first roads and the development of mining and agricultural plantations in the region. Over the last 60 years, and most probably in the last 30, considerable migratory movements have invaded large portions of the Ituri region. This immigration continued even during the last conflicts between 1996 and 2003 and in spite of the clashes between rival militias who were present throughout the region. Some immigrants were fleeing insecurity in their home region; however, even during the periods of conflict most of them were motivated by economic opportunities. These opportunities included easy access to cultivable land, jobs in mining or small-scale forestry and small business that these activities generated. Most recent immigrants come from the densely populated heights of the Albertine Rift, where the population density is over 100 inhabitants/km^2 and accessing new agricultural land is becoming difficult. The population of the major urban centres on the eastern edge of Ituri forested area is increasing at the rate of 4.2% a year. In the northwest, the population is also growing quickly. The regions adjacent to the Ituri forested area are undergoing the most substantial deforestation in DRC.
Mambasa and Nia-Nia, the two major centres, have fewer that 20,000 inhabitants, but are growing rapidly. Very roughly, the total population in the Ituri forested area and its immediate periphery can be estimated at 300,000.
The semi-nomadic Mbuti and Efe were likely to be the first inhabitants of the region, but it is not known when they arrived. While their current way of life is similar to what it was originally, these Pygmies have not been able to live inside the forest independently of other ethnic groups and had to colonize the forest at the same time as groups practicing shifting agriculture. Manioc, banana-plantain, rain-fed rice, taro, yams and groundnuts are the main crops in the region. The agriculture practiced by the groups who traditionally live in the forest is based on fallow period (10 years + 2 years cropping). In area where fallow periods are still long, clearing of the primary forest is very limited. The mosaic of secondary forest is rich in palm trees *Elaeis guineensis* and *Raphia spp.*.
The recent immigrant practices are more intensive agriculture, which larger fields, shorter fallow periods and more extensive clearing if primary forest. Fallow periods of 5 years or less lead to soil becoming depleted, regeneration of forest coming to a halt and the forest begin replaced by prairies of *Imperata* or thickets of bush and lianas.
During the late colonial period and up to the 1970s, there was substantial production for marketing: rainfed rice, palm oil and coffee. The traditional forest population had very few cash crops. Today the production is minimal and some plantations have been invaded by the forest.

Logging. Logging legislation in DRC is based on the forest concession attribution. It depends on three principle attribution modes: prospecting authorization, intentional letter or contract, and supply guarantee. The forester can harvest the forest during the two last steps if he possesses a cutting permit and if he has provided an exploitation inventory. The maximal area of one cutting permit is 1,000 ha and the forester

can apply for another one based on his capacity. There are two types of cutting permits: the normal one and the special one. These permits give the maximal exploitation volume for each species. The annual area size given to the forester is less than 100,000 ha. Currently there are no references concerning biodiversity in the forest concessions. Concepts such as wood certification and biodiversity conservation in forest concessions are to be implemented yet (Sébastien et al., 2001).
Timber extraction in DRC is accelerating as over 3 million ha of forest have been allocated or re-allocated for logging in the last decades. Greater than 70% of timber harvested consists of two valuable species of African Mohagany. This high-grading process has a lasting effect on the stem density and canopy composition of the forest; it could also lead to an irreversible impoverishment of Entandrophragma species if adequate sylviculture practises are not developed and implemented. Furthermore large-mammal populations are being threatened with encroachment of poachers and small-mammal communities altered with the increase of edge habitat. In general there is a positive correlation ($R^2 = 0.59$) between the number of trees harvested and the percentage of exploitable forest per 50 ha harvesting unit (www.luci.umd./lcluc).

For the Ituri forested areas, the logging is concentrated in semi-deciduous forests, near the transitional area between the dense forest and the wooded savannahs in the east, where valuable species such as *Milicia excelsa* and *Khaya anthotheca* are more abundant.
There were no concessions in the initial forested area of Ituri. Most logging in the Ituri forested area is in the form of small-scale activities.

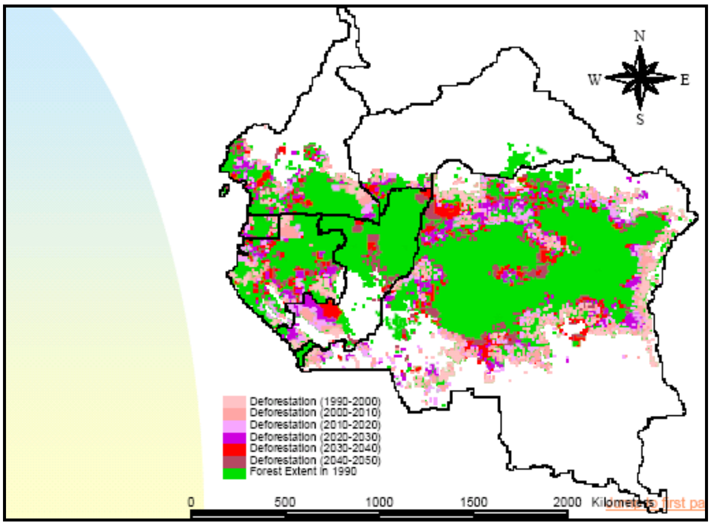

Figure A-2 Laporte's map (2000) shows deforestation level forecasted in DRC in the next 50 years.

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A.5.3. Species and varieties selected:

Phytogeographical analysis. In selecting species for forestation/reforestation, it is preferable to choose the species already growing in the area because they will adapt to the local environment and obviously will be able to regenerate naturally. Although growth may be slower than for exotics species, this is of less importance since wood yield could not be the immediately purpose (Evans, 1982).

In order to conserve MDF structure it is important to choose species from original forests, in particular species from the upper forest level (45 - 35 m): *Gilbertiodendron dewevrei, Brachystegia laurentii, Julbernadia seretii*. These plants are evergreen and shade-tolerant species.
On the other hand in order to analyze the carbon exchange at the macro-regional level in RDC – forest and biomass extension and deforestation rate – Laporte et al. (2000) have calculate the forestal biomass as 251-500 t/ha in the Congo Basin. The FAO's analysis (1980; 1993) as reported by Laporte (2000), esteemed 15.20 Pg carbon stock in 1990 and 17.16 Pg in 1980. For the same period the theoretical esteemed carbon sequestration was potentially about $8.65*10^{15}$g by forest growth and $18.53*10^{15}$g by reforestation. Carbon flux and stocks seem to be not important when there is a business as usually lands use traditional regime (agriculture and slash and burn shifting cultivation) and have a low human population density. In this situation the demographic growth is low. The forecast deforestation models have showed a deforestation rate in Central Africa around 0.6%, during the 1980-90 period (Laporte, 2000).
The most interesting species in order to contrast CO_2 gas is *Musanga cecropioides*, a typical plant of upper secondary forest level and re-grown forest, which is a pioneer fast-growing (15 m height in 3 years) and light demanding species. *Gilbertiodendron dewevrei,* compared to *Musanga cecropioides*, has an opposite growth-model with a slow young growth phase and a faster growth at the 6 - 7^{th} year of life cycle. One important aspect of mesophyle species, like *Musanga cecropioides*, is their high fructification and dissemination activity, like endozoochory and anemochory typologies. Another important biological aspect of these species is their gregariousness, particularly present in *Trema spp., Musanga spp., Terminalia spp.* By using these species from Secondary Forest we could improve the ecological succession in natural way in regions where some species like *Musanga spp.*, *Polyscias spp*. and *Trema orientalis* colonize herbaceous vegetation on colluvional substrate. At this level, it is possible to identify a phytogeographical species sequence from the association of *Musanga* and *Terminalia spp* to the presence of "mesophile et ombrophile" formations as described by Lebrun & Gilbert (1954). The good response to CO_2 accumulation by *Musanga cecropioides* enables us to use this species to reforest sub-canopy strata (under-storey), while others forest species can naturally grow.
The choice of forest plants responds to a number of purposes. To enhance environmental protection by CO_2 gas sequestration and multipurpose plantation (industrial and biomedical uses), we will use *Musanga cecropioides* plantations. Its under-storey natural regrowth results in a high rate of CO_2 accumulation by a living biomass and provides also important pharmacological substances by aqueous extract of the leaves. From both we can obtain organic carbon stoked at the end of long vegetative cycle. In this case we will use the commercial species generally native to the Congo Basin *Aucoumea klaineana, Terminalia superba, Gilbertiodendron dewevrei, Brachystegia laurentii, Julbernadia seretii, Baillonella toxisperma, Afromosia elata, Tieghemella africana, Fagara heitzii, Guarea cedrata, Oxystigma oxyphyllum, Chlorophora excelsa, Staudtia stipitata, Nauclea diderrichi Coelocaryon preussii*).
Aucoumea klaineana has been chosen because its ecological response to plantation system is very good in Congo River Basin region and many years have been spent on forest experimentation of *Aucoumea klaineana* in wet climatic zones respect to others trees species. These facts have been important for our choice.

Table A-1 shows some of the most representative forest species living in the region.

TABLE A-1 - Some of the most representative species	
	Phytogeographical

	Class			
Species	**MDF**	**SDTF**	**FW**	**SF**
Albizia spp.				X
Albizia zygia				X
Albizia ferruginea		X		
Amphimas pterocarpoides		X		
Anopyxis ealaensis S.		X		
Antiaris welwitschii E.				
Anonidium mannii O. E.&D.		X		
Baikiaea insignis subsp. minor	X			
Bombax flammeum				X
Brachystegia laurentii	X			
Caloncoba welwitschii O.				X
Canarium schweinfurthii	X			
Celtis kraussiana B.				X
Celtis spp.		X		
Cynometra alexandri	X			
Cleistopholis patens			X	
Copaifera spp. (Soyauxii)		X		
Cordia chrysocarpa B.				X
Dialium spp.		X		
Diogoa zenkeri	X			
Diospyrus spp.	X			
Entandrophragma angolese		X		
Entandrophragma spp.		X		
Ficus mucuso F.			X	
Gilbertiodendron dewevrei	X		X	
Gilbertiodendron spp. (Ogounse)	X			
Gossweilerodendron balsamiferum		X		
Guarea cedrata		X		
Guarea thompsonii		X		
Harungana madascariensis				X
Heisteria parvifolia	X			
Isolona thonneri DW.&T.D. E.&D.	X			
Julbernadia seretii	X			
Lannea welwitschii			X	
Lovoa trichilioides				X
Maba spp.	X			
Maesa rufescens A. DC.				X
Milletia spp.				X
Musanga cecropioides				X
Oxystigma buccholzii			X	
Oxystigma oxyphyllum H. J.L.		X	X	
Parinari glaberrimum		X		

Parkia spp.				X
Pavetta tetramera	X			
Pericopsis elata		X		
Phyllanthus discoideus				X
Polyalthia suavaeoleus	X	X		
Polyscias spp.				X
Pseudospondias microcarpa			X	
Psychotria spp. (Brevipaninculata)	X			
Pygeum africanum				X
Sapium cornutum				X
Schotia romii (Leonardoxa romii) DW. A.	X			
Scorodophloeus zenkeri H.		X	X	
Spathodea campanulata				X
Spondianthus preussi			X	
Staudia stipitata	X	X		
Terminalia spp.				X
Terminalia superba				X
Trema orientalis				X
Trema spp.				X
Uapaca guineensis				X
Uapaca heudelotii			X	

LEGEND:
MDF = Moist Dense Forest
SDTF Semi-deciduous Tropical Forest
FW= Forest Swamp
SF= Secondary Forest

Table A-2 shows timber species potentially useful for the project site. *

TABLE A-2 - Timber species potentially chosen for project site					
BOTANICAL NAME	**COMMON NAME**	**WOOD DENSITIES (G/CM3 OR T/M3)**	**DHB (cm)**	**VOLUME (mc)/ha**	**TREE DENSITIES trees/ha**
Aucoumea klaineana	Okoumé	0,37	101,9	1,7 - 21,5	15

* The mass of a volume unit refers to the basal density value.

Parameters reported in Tables A-1 and A-2 are shown for completeness but, however, they will not be used in the calculation of estimated amount of net anthropogenic GHG removals by sinks because the reforestation activities will be carried on only in order to contrast illegal logging.
Not using these parameters will not affect calculation: a conservative calculation policy has been chosen and the actual absorption of CO_2 e will be higher than the value estimated.

REFERENCES
- Evans J..1982. *Plantation Forestry in the Tropics*, Clarendon Press-Oxford, UK.
- Laporte N., Justice C.. 2000. *Les besoins d'iformation pour l'analyse des changements climatiques mondiaux,* Atelier GOFC-Libreville.
- Lebrun J., Gilbert G.. 1954. *Une classification écologique des forêts du Congo*. INEAC, Série Scientifique, No. 63.

A.5.4. Technology to be employed by the proposed project activity:

The project will eventually use traditional technology for the replanting works .
In the active conservation approach through vegetation restore and replanting, the project will be structured in the following items:

- Temporary Nursery
  A temporary nursery is established to provide the seedlings for the replantation or plantation on bare soil without forest cover at short distance. We will use direct plantation of stumps. Seedlings will be generated in temporary on-site nurseries besides streams and irrigated by stream water. Seedlings are raised in polythene tubes. Selection of seedlings to be planted is done in accordance with the quality standards of the Service National de Reboisement (SNR) of DRC.
- Plantation of seedlings
  Plantation is done by pit-hoeing and hand plantation. Vehicles are only used to transport the plants to the planting area. Planting sections are marked by poles.
- Maintenance
  Maintenance is done according to the recommendations of the SNR.
- Fire control and security
  Fire control eventually is based on two columns: a grid of fire lines and fire control personnel.

Forest techniques for planting. These techniques are collected *in situ* and thus we will adapt the best silvicultural techniques to physiological features of the species to plant. We illustrate the principal forest techniques below.
The phases of seed procurement are:

1. seedling or stump or seed harvesting in natural forest and in secondary forest (considering that seed bearing age varies greatly);
2. flowering habit;
3. seed dispersal patterns.

In general, the aim of seedlings or seeds collection is to obtain large quantities of seedlings or seeds of the best genetic quality and from natural stands collections and should be made from trees of good phenotype. The timing of collection is variable according to the species (Evans, 1982). In this case the main aim is to implement an ecological restore preserving a high biodiversity level.
The methods of seed collection are based on preliminary ground collection of natural fallen seed.
The seed storage will be done by dry way or by moist and cold way. The dry storage is possible when species can withstand drying below 8 % moisture content. Seeds can be stored for at least 3 years. The moist cold storage is possible when seeds require high moisture content between ripening and germination (Evans, 1982). Other sources of planting materials are available for reforestation. Natural forest seedlings or wildlings and root suckers are sometimes transplanted, usually from moist tropical forest, with variable results. Stumps, subjected to drastic pruning of both roots and shoot, can be planted directly into the ground.

Replanting-restore techniques. The reforestation activity will be carried out referring to the technique called "*Okoumé Technique*" on the over-logged natural forest zone.

Over-logged natural forest zone. In these areas we are planning either modified oligo-specific plantations or poly-specific semi-natural re-growth zones. In this case we prefer to use some shade-intolerant forest plants as *Aucoumea klaineana* using a directly plantation of seedlings or stumps (1 m high and 4 cm of diameter) during the early rain season. The average diametric growth of this plant is around 1.66 cm/year up to trees 5 years old; 1.91 cm/year up to trees 10 years; 1.77 cm/year up to trees 15 years old; 1,51 cm/year up to trees 20 years old; 1.45 cm/year up to trees 25 years old; 1.14 cm/year up to trees 30 years old; 0.95 cm/year up to trees 35 years old; 0.72 cm/year up to trees 40 years old; 0.7 cm/year up to trees 45 years old; 0.68 cm/year up to trees 50 years old.
The high growth is about 1.5 - 2 m/year and the general volume increment is between 0.75 - 1 m^3 for stand 15 years old.
Also in this case the natural re-growth will be stimulated to increase the original species richness. *Musanga cecropioides* and *Caloncoba welwitschii* are two secondary colonizing species in under-storey strata.

REFERENCES

- Borota J.L.. 1991. *Tropical Forests*. Elsevier.
- Bruenig E.F.. 1996. *Conservation and Management of Tropical Rainforest*. CAB-International.
- Evans J.. 1982. *Plantation Forestry in the Tropics*, Clarendon Press-Oxford, UK.
- OTA. 1983. *Sustaining tropical forest resources. Reforestation of degraded lands*, Background Paper, No. 1.

A.6. A description of legal title to the land, current land tenure and land use and rights to VERs issued:

The area involved in the project is own by the State, but recently the Local Community, that has to run the forest, has sold the area to the Proponent of the Project with the possibility to use it for an indeterminate period of time but the Proponent has to pay it by a fixed period of time (9 years). Consequently, there is no current land tenure and land use but now there is the opportunity to make deforestation. The rights to VERs issued are for the Proponent of the Project that, in this way, could make business through the Carbon Finance and avoid deforestation. Without Carbon Finance (market of VERs) the logging concession will be exploited: hence the deforestation.
See Annex 3 for details regarding legal title to the land, current land tenure and land use.

A.7. Assessment of the eligibility of land:

The area is eligible because actually the only possible exploitation of the forest is timber collection and trading. So, in order to avoid the deforestation, the only possible way is to get money from the Carbon Finance. It is fundamental to underline that during the crediting period of 9 years no logging activity is expected in presence of carbon revenue. Indeed the present project aims to avoid deforestation through Carbon Finance. More specifically, Carbon Finance means the selling of VERs arising from this project.
See Annex 3 for details regarding current land tenure and land use, as well as the eligibility of land.

A.8. Duration of the proposed project activity / Crediting period:

Crediting period is equal to 9 years. Anyway, the duration of the proposed project activity could be longer than 9 years depending on how long funds from the Carbon Finance will be available. Moreover, even if now it is only possible to generate VERs with this kind of project activity (safeguard and conservation of forest) perhaps in the future it will be possible to also generate CERs.

A.8.1. Starting date of the proposed project activity and of the crediting period:

January 2008.

A.8.2. Expected operational lifetime of the proposed project activity:

As long as possible, depending on how long funds from the Carbon Finance will be available. Moreover, even if now it is only possible to generate VERs with this kind of project activity (safeguard and conservation of forest) perhaps in the future it will be possible to also generate CERs.

SECTION B. Estimation of net anthropogenic GHG removals by sinks:

B.1. Estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:

Please provide the total estimation of net anthropogenic GHG removals by sinks as well as annual estimates for the chosen crediting period. Information on the net anthropogenic GHG removals by sinks shall be indicated using the following tabular format.

The following tabular format shows the total estimation of net anthropogenic GHG removals by sinks, as well as annual estimates, in the case of a Standard Unit of 1,000 ha (as it is possible to see in the Figures A-1h and A-1i) for a crediting period of 9 years.

In accordance with the approach called "Tier 1", inventory data and policy of avoiding deforestation lead to a constant value through the crediting period. A possible change of the parameters and consequently of the CO_2 absorption calculation will be possible when a new verification activity will be implemented in a later time. The new verification activity might lead to different parameters or confirm initial parameters. In case of any act able to change the condition of the area (e.g. large fires, earthquakes, intense illegal logging, etc) the holder of the logging concession (Planète sprl) will inform on the variation that would have occurred. In principle, the initial conditions should not change through eco-friendly activities and patrolling which will discourage illegal logging and, moreover, reforestation activities that will compensate the loss of trees.

See Annex 2 for details of calculation and explanation of the above mentioned approach called "Tier 1".

Years	**Annual estimation of net anthropogenic GHG removals by sinks in tonnes of CO_2 e / 1,000 ha**
Year 2008	6,813 tonnes CO_2 e
Year 2009	6,813 tonnes CO_2 e
Year 2010	6,813 tonnes CO_2 e
Year 2011	6,813 tonnes CO_2 e
Year 2012	6,813 tonnes CO_2 e
Year 2013	6,813 tonnes CO_2 e
Year 2014	6,813 tonnes CO_2 e
Year 2015	6,813 tonnes CO_2 e
Year 2016	6,813 tonnes CO_2 e
Total estimated net anthropogenic GHG removals by sinks (tonnes of CO_2 e)	61,317 tonnes CO_2 e
Total number of crediting years	9 years
Annual average over the crediting period of estimated net anthropogenic GHG removals by sinks (tonnes of CO_2 e)	6,813 tonnes CO_2 e

SECTION C. Environmental impacts of the proposed project activity:

C.1. Provide analysis of the environmental impacts, including transboundary impacts (if any):

Obviously the project influences in a positive manner the natural ecosystems and the biodiversity (both vegetable and animal) characterizing the geographic area involved in the activity of safeguard and conservation of forest.

Moreover we can list at least three basic positive environmental impacts of the safeguard and conservation of forest (that means also avoiding the deforestation activity and, consequently, the negative impact of this activity):

- reduction of soil erosion;
- increasing water storage capacity and water quality;
- contribution to climatic amelioration through carbon sequestration.

Nevertheless the Proponent of the Project, in cooperation with the University of Kinshasa (Democratic Republic of Congo), the University of Florence (Italy) and other universities of foreign countries, will have the opportunity to initiate an environmental monitoring program. That will include research (graduate theses, master theses, PhD theses etc) on long term impact of the activities of the Proponent on the flora, fauna, soil, water regime and micro climate of the project area, and moreover, the study of the endemic species of plants and animals typical of this region.

C.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken an environmental impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

There are no significant negative impacts anticipated by the project activities.

SECTION D. Socio-economic impacts of the proposed project activity:

D.1. Provide analysis of the socio-economic impacts, including transboundary impacts (if any):

The present project will have significant socio-economic impacts in and outside the project boundaries.

The Ituri region is situated in a very poor region. The project will create a positive socio-economic impact for several reasons, including the creation of new work opportunities, training (education and instruction) for these new typologies of working activities, and other investments associated with the activity of biodiversity conservation.
Particularly, the planning of a multidirectional activity is expected:

- introduction of activities for the economic support in a broad sense, specifically the implementation of the trading of local products (such as palm oil, coffee and honey) in order to provide a different economic resource for local human communities instead of the illegal deforestation activity;
- informative and educational programmes (in order to discourage the alimentary use of Non-Human Primates, train for an economic sustainable use of the forest, and fight the HIV virus spreading);
- training of skilled staff to be sent "into the field" (in order to carry out every phase of the project).

Furthermore it has to be mentioned that conservation of plant and animal biodiversity, could support future eco-tourism activities, which could have the crucial role of allowing the financial autonomy (obtained in a sustainable manner) of the protected forested area.

D.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken a socio-economic impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

There are no significant negative impacts anticipated by the project activities.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROPOSED PROJECT ACTIVITY

Organization:	Planète sprl
Street/P.O.Box:	Avenue Colonel Ebeya,13
City:	Kinshasa
State/Region:	*Commune de la Gombe*
Country:	Democratic Republic of Congo
Represented by:	Placide Nzunzu Diapembe
Title:	Engineer
Salutation:	*Le Gérant*

Annex 2

EXPECTED GHG EMISSION REDUCTIONS

The Good Practice Guidance for Land Use, Land-Use Change and Forestry Guidelines (IPCC, 2003) was applied. All equation and table mentioned here below refer to this volume.

In accordance with Good Practice Guidance for Land Use, Land-Use Change and Forestry Guideline, three different tiers of accuracy are possible (called respectively Tier 1, 2 and 3) in order to estimate the amount of net anthropogenic GHG removals by sinks.
When local data are unavailable, as in the present case, National Inventory Data can be used (Tier 1). Within this context, three different values are available: a maximum, a medium and a minimum value. In the present estimation, for the purpose of CO_2 absorption calculation as well as for all parameters utilised, the average data have been chosen.
This approach offers a conservative final estimation because actual CO_2 absorption might be higher than the calculated ones (potentially achievable using the higher values). For the same reason, no CO_2 absorption has been taken into account arising from reforestation activities. Moreover, illegal logging activities are also estimated through default values: this approach provides a higher value than the actual one because the real illegal logging activity will be lower. Besides, as seen in the calculation results, reforestation activity will compensate illegal logging.
Altogether, higher CO_2 absorption will be achieved; hence no over-selling of VERs will be possible.

The emissions reduction will be achieved by the photosynthetic sequestering of CO_2 in the above- and below- ground biomass of the trees. Carbon stock of mineral soil, dead wood and litter were omitted because it is assumed that the carbon stock of these pools will not decrease in the baseline scenario more than as a result of proposed project activity. The carbon stock change for the above- and below- ground biomass in living trees was estimated with the method using approximation of total carbon stock in biomass of living trees in two different moments of time.
Parameters used in the calculations were from Good Practice Guidance for Land Use, Land-Use Change and Forestry Guidelines and the DRC National Inventory (FAO, 2005; IPCC, 2003).

Greenhouse gas inventory for the land-use category "Forest Land Remaining Forest Land (FF)" involves estimation of changes in carbon stock from five carbon pools (i.e. aboveground biomass, belowground biomass, dead wood, litter, and soil organic matter), as well as emissions of non-CO_2 gases from such pools. The summary equation, which estimates the annual emissions or removals from FF with respect to changes in carbon pools is given in Equation 3.2.1.

$$\Delta C_{FF} = \left(\Delta C_{FF_{LB}} + \Delta C_{FF_{DOM}} + \Delta C_{FF_{Soils}}\right) \qquad \textbf{(3.2.1)}$$

Where:

ΔC_{FF} = annual change in carbon stocks from forest land remaining forest land, tonnes C yr^{-1}

$\Delta C_{FF_{LB}}$ = annual change in carbon stocks in living biomass (includes above- and below-ground biomass) in forest land remaining forest land, tonnes C yr^{-1}

$\Delta C_{FF_{DOM}}$ = annual change in carbon stocks in dead organic matter (includes dead wood and litter) in forest land remaining forest land, tonnes C yr^{-1}

$\Delta C_{FF_{Soils}}$ = annual change in carbon stocks in soils in forest land remaining forest land, tonnes C yr^{-1}

ΔC_{FF} = (0.498 + 0 + 1.360) tonnes C yr^{-1} = 1.858 tonnes C yr^{-1} (for 1 ha)

To convert tonnes C to Gg CO_2, multiply the value by 44/12 and 10^{-3}.

= 1.858 tonnes C yr^{-1} × 44/12 tonnes CO_2 tonnes C^{-1} = 6.813 tonnes CO_2 yr^{-1} (for 1 ha)

Change in carbon stocks in living biomass. Carbon stock change is calculated by multiplying the difference in oven dry weight of biomass increments and losses with the appropriate carbon fraction. This section presents methods for estimating biomass increments and the losses. Increments include biomass growth. Losses include fellings, fuelwood gathering, and natural losses.

The method chosen for estimating carbon stock changes in biomass is **method 1** (also called **default method**): this method requires the biomass carbon loss to be subtracted from the biomass carbon increment for the reporting year.

Summary of steps for estimating change in carbon stocks in living biomass using the default method: from Step 1 to Step 8.

Step 1: Categorise the area (A) of forest land remaining forest land into forest types of different climatic zones, as adopted by the country. As a point of reference, Table 3A.1.1 provides national level data of forest area and annual change in forest area by region and by country as a means of verification.

***Règion du Ituri*: TROPICAL MOIST (Mean Annual Precipitation 1,000 – 2,000 mm).**

Step 2: Estimate the average annual increment in biomass (G_{TOTAL}) using Equation 3.2.5. If data of the average annual aboveground biomass increment (G_W) are available, use Equation 3.2.5A. Tables 3A.1.5 provides average annual aboveground biomass increment (G_W), while Table 3A.1.8 provides root-shoot ratio appropriate to increments (R).

$$G_{TOTAL} = G_W \bullet (1 + R) \qquad \textbf{(3.2.5A)}$$

Where:

G_{TOTAL} = average annual biomass increment above and below ground; tonnes d.m. ha^{-1} yr^{-1}

G_W = average annual aboveground biomass increment in, tonnes d.m. ha^{-1} yr^{-1}

R = root-shoot ratio appropriate to increments, dimensionless

G_{TOTAL} = 1.3 tonnes d.m. ha^{-1} yr^{-1} × (1 + 0.42) = 1.846 tonnes d.m. ha^{-1} yr^{-1}

Step 3: Estimate the annual increase in carbon stocks due to biomass increment (ΔC_{FFG}) using Equation 3.2.4.

$$\Delta C_{FF_G} = \sum_{ij} \left(A_{ij} \bullet G_{TOTAL\,ij}\right) \bullet CF \qquad \textbf{(3.2.4)}$$

Where:

ΔC_{FF_G} = annual increase in carbon stocks due to biomass increment in forest land remaining forest land by forest type and climatic zone, tonnes C yr^{-1}
A_{ij} = area of forest land remaining forest land, by forest type (i = 1 to n) and climatic zone (j = 1 to m), ha
$G_{TOTAL_{ij}}$ = average annual increment rate in total biomass in units of dry matter, by forest type (i = 1 to n) and climatic zone (j = 1 to m), tonnes d.m. ha^{-1} yr^{-1}
CF = carbon fraction of dry matter (default = 0.5), tonnes C (tonne d.m.)$^{-1}$

ΔC_{FFG} = 1 ha × 1.846 tonnes d.m. ha^{-1} yr^{-1} × 0.5 tonnes C (tonne d.m.)$^{-1}$ = 0.923 tonnes C yr^{-1}

Step 4: Estimate the annual carbon loss due to commercial fellings ($L_{fellings}$) using Equation 3.2.7. Table 3A.1.9 provides basic wood density (D), while Table 3A.1.10 provides biomass expansion factor for converting volumes of extracted roundwood to total aboveground biomass (BEF_2).

$$L_{fellings} = H \bullet D \bullet BEF_2 \bullet (1 - f_{BL}) \bullet CF \qquad \textbf{(3.2.7)}$$

Where:

$L_{fellings}$ = annual carbon loss due to commercial fellings, tonnes C yr^{-1}
H = annually extracted volume, roundwood, m^3 yr^{-1}
D = basic wood density, tonnes d.m. m^{-3}
BEF_2 = biomass expansion factor for converting volumes of extracted roundwood to total aboveground biomass (including bark), dimensionless
f_{BL} = fraction of biomass left to decay in forest (transferred to dead organic matter)
CF = carbon fraction of dry matter (default = 0.5), tonnes C (tonne d.m.)$^{-1}$

Total biomass associated with the volume of the extracted roundwood is considered as an immediate emission. This is the default assumption and implies that f_{BL} should be set to 0.

Extraction of roundwood is published in the UNECE/FAO Timber Bulletin and FAO Yearbook of Forest Products. The latter is based primarily on data provided by the countries. In the absence of official data, FAO provides an estimate based on the best information available.

The roundwood data includes all wood removed from forests which are reported in cubic meters underbark. The underbark data needs converting to overbark for use with BEF_2. For most tree species bark makes up about 10% to 20% of the overbark stem volume. Unless country specific data are available, 15% should be used as a default value and the FAO overbark volume can be estimated by dividing the underbark estimate by 0.85 before using the values in Equation 3.2.7.

Specifically, in this case the default value of annual extraction of roundwood - as reported by FAO Yearbook of Forest Products (FAO, 2005) - is equal to 72,170,000 cubic meters underbark per year. Afterwards, the FAO overbark volume can be estimated dividing the underbark estimate by 0.85: so it has turned out a value of 84,905,882 cubic meters overbark per year. Finally, this value has been divided by the worth of national dry land surface - 226,760,000 hectares - and so we got the value of H (annual extracted volume, roundwood) that is equal to 0.373 cubic meters per hectare per year.

At this purpose we would like to underline that the decision of utilize the national dry land surface (that, clearly, is larger than the only national forest surface) is due to two main reasons: i) the absence of assured data about the actual forest surface (owing to the continuous changes of exploitation of overall Congolese forest); ii) the assumption that no (legal and/or illegal) logging activity will be carried out in the present forest area during the crediting period.

$L_{fellings}$ = 0.373 m^3 yr^{-1} ha^{-1} × 0.37 tonnes d.m. m^{-3} × 3.4 × 1 × 0.5 tonnes C (tonne d.m.)$^{-1}$ = 0.235 tonnes C yr^{-1} ha^{-1}

Step 5: Estimate annual carbon loss due to fuelwood gathering ($L_{fuelwood}$) using Equation 3.2.8. Table 3A.1.9 provides basic wood density (D), while Table 3A.1.10 provides biomass expansion factor for converting volumes of extracted roundwood to total aboveground biomass (BEF_2).

$$L_{fuelwood} = FG \bullet D \bullet BEF_2 \bullet CF \qquad \textbf{(3.2.8)}$$

Where:

$L_{fuelwood}$ = annual carbon loss due to fuelwood gathering, tonnes C yr^{-1}
FG = annual volume of fuelwood gathering, m^3 yr^{-1}
D = basic wood density, tonnes d.m. m^{-3}
BEF_2 = biomass expansion factor for converting volumes of extracted roundwood to total aboveground biomass (including bark), dimensionless
CF = carbon fraction of dry matter (default = 0.5), tonnes C (tonne d.m.)$^{-1}$

Specifically, in this case the default value of annual volume of fuelwood gathering - as reported by FAO Yearbook of Forest Products (FAO, 2005) - is equal to 68,517,000 cubic meters per year. Successively, this value has been divided by the worth of national dry land surface - 226,760,000 hectares - and so we got the value of FG (annual volume of fuelwood gathering) that is equal to 0.302 cubic meters per hectare per year.

$L_{fuelwood}$ = 0.302 m^3 yr^{-1} ha^{-1} × 0.37 tonnes d.m. m^{-3} × 3.4 × 0.5 tonnes C (tonne d.m.)$^{-1}$ = 0.190 tonnes C yr^{-1} ha^{-1}

Step 6: Estimate annual carbon loss due to other losses ($L_{other\ losses}$) using Equation 3.2.9. Table 3A.1.4 provides average biomass stock of forest areas (B_W), while Table 3A.1.11 provides fraction of biomass left to decay in forest (transferred to dead organic matter).

$$L_{other\ \ losses} = A_{disturbance} \bullet B_W \left(1 - f_{BL}\right) \bullet CF \qquad \textbf{(3.2.9)}$$

Where:

$L_{other\ \ losses}$ = annual other losses of carbon, tonnes C yr^{-1}

$A_{disturbance}$ = forest areas affected by disturbances, ha yr^{-1}

B_W = average biomass stock of forest areas, tonnes d.m. ha^{-1}

f_{BL} = fraction of biomass left to decay in forest (transferred to dead organic matter)

CF = carbon fraction of dry matter (default = 0.5), tonnes C (tonne d.m.)$^{-1}$

Disturbances are assumed to affect the aboveground biomass only; it is also assumed that all aboveground biomass carbon is lost upon disturbance. Hence, f_{BL} is equal to zero.

$L_{other\ losses}$ = 0 tonnes C yr^{-1} ha^{-1}

$L_{other\ losses}$ is set to 0 because of Tier 1.

Step 7: From the estimated losses in Steps 4 to 6, estimate the annual decrease in carbon stocks due to biomass loss (ΔC_{FFL}) using Equation 3.2.6;

$$\Delta C_{FF_L} = \left[L_{fellings} + L_{fuelwood} + L_{other\ \ losses} \right] \qquad \textbf{(3.2.6)}$$

Where:

ΔC_{FF_L} = annual decrease in carbon stocks due to biomass loss in forest land remaining forest land, tonnes C yr^{-1}

$L_{fellings}$ = annual carbon loss due to commercial fellings, tonnes C yr^{-1}

$L_{fuelwood}$ = annual carbon loss due to fuelwood gathering, tonnes C. yr^{-1}

$L_{other\ \ losses}$ = annual other losses of carbon, tonnes C yr^{-1}

$\Delta C_{FF\ L}$ = (0.235 + 0.190 + 0) tonnes C yr^{-1} ha^{-1} = 0.425 tonnes C yr^{-1} ha^{-1}

Step 8: Estimate the annual change in carbon stocks in living biomass (ΔC_{FFLB}) using Equation 3.2.2.

$$\Delta C_{FF_{LB}} = \left(\Delta C_{FF_G} - \Delta C_{FF_L}\right) \qquad \textbf{(3.2.2)}$$

$\Delta C_{FF_{LB}}$ = annual change in carbon stocks in living biomass (includes above- and below-ground) in forest land remaining forest land, tonnes C yr^{-1}

ΔC_{FF_G} = annual increase in carbon stocks due to biomass growth, tonnes C yr^{-1}

ΔC_{FF_L} = annual decrease in carbon stocks due to biomass loss, tonnes C yr^{-1}

$\Delta C_{FF\ LB}$ = (0.923 – 0.425) tonnes C yr^{-1} = 0.498 tonnes C yr^{-1} (for 1 ha)

Change in carbon stocks in dead organic matter. This section elaborates *good practices* for estimating carbon stock changes associated with dead organic matter pools. The *IPCC Guidelines* assume as a default that changes in carbon stocks in these pools are not significant and can be assumed zero, i.e. that inputs balance losses so that net dead organic matter carbon stock changes are zero.

Separate guidance is provided here for two types of dead organic matter pools: 1) dead wood and 2) litter. Equation 3.2.10 summarises the calculation for change in dead organic matter carbon pools.

$$\Delta C_{FF_{DOM}} = \Delta C_{FF_{DW}} + \Delta C_{FF_{LT}} \qquad \textbf{(3.2.10)}$$

Where:

$\Delta C_{FF_{DOM}}$ = annual change in carbon stocks in dead organic matter (includes dead wood and litter) in forest land remaining forest land, tonnes C yr^{-1}

$\Delta C_{FF_{DW}}$ = change in carbon stocks in dead wood in forest land remaining forest land, tonnes C yr^{-1}

$\Delta C_{FF_{LT}}$ = change in carbon stocks in litter in forest land remaining forest land, tonnes C yr^{-1}

$\Delta C_{FF\ DOM}$ = 0 tonnes C yr^{-1}

Change in carbon stocks in soils.
This selection elaborates on estimation procedures and *good practices* for estimating change in carbon stocks from and to forest soils. Separate guidance is provided for two types of forest soils carbon pools: 1) the organic fraction of mineral forest soils, and 2) organic soils. The change in carbon stocks in soils in forest land remaining forest land ($\Delta C_{FF\ Soils}$) is equal to the sum of changes in carbon stocks in the mineral soil ($\Delta C_{FF\ Mineral}$) and the organic soil ($\Delta C_{FF\ Organic}$).

Mineral soils.
Conceptually, emissions or removals of carbon from the mineral forest soil pool can be calculated as annual changes in soil organic carbon stocks for an area of forest land undergoing a transition from state *i* to state *j*, where each state corresponds to a given combination of forest type, management intensity and disturbance regime. This is illustrated by equation 3.2.14.

$$\Delta C_{FF_{MINERAL}} = \sum_{ij} \left[\left(SOC_j - SOC_i\right) \bullet A_{ij} \right] / T_{ij} \qquad \textbf{(3.2.14)}$$

Where:

$\Delta C_{FF_{MINERAL}}$ = annual change in carbon stocks in mineral soils in forest land remaining forest land, tonnes C yr^{-1}

SOC_i = stable soil organic carbon stock, under previous state *i*, tonnes C ha^{-1}

SOC_j = stable soil organic carbon stock, under previous state *j*, tonnes C ha^{-1}

A_{ij} = forest area undergoing a transition from state *i* to *j*, ha

T_{ij} = time period of the transition from SOC_i to SOC_j, yr

$\Delta C_{FF\ MINERAL}$ = 0 tonnes C yr^{-1}

$\Delta C_{FF\ MINERAL}$ is set to 0 because of Tier 1.

Organic soils.
Current knowledge and data limitations constrain the development of a default methodology for estimating CO_2 emissions to and from drained, organic forest soils. Guidance will be limited to the estimation of carbon emissions associated with the drainage of organic soils in managed forests (Equation 3.2.14). Table 3.2.3 provides default values for CO_2-C emission factor for drained organic soils in managed forests.

Equatorial climate, continuous vegetation, absence of seasons and latitude contribute to achieve very high values (as value resulted by this estimation).

$$\Delta C_{FF_{Organic}} = \Delta C_{Drained} \bullet EF_{Drainage} \quad \textbf{(3.2.15)}$$

Where:

$\Delta C_{FF_{Organic}}$ = CO_2 emissions from drained organic forest soils, tonnes C yr^{-1}

$\Delta C_{Drained}$ = area of drained organic forest soils, ha

$EF_{Drainage}$ = emission factor for CO_2 from drained organic forest soils, tonnes C ha^{-1} yr^{-1}

$\Delta C_{FF\ ORGANIC}$ = 1 ha × 1.36 tonnes C ha^{-1} yr^{-1} = 1.36 tonnes C yr^{-1}

REFERENCES

- FAO 2005. *FAO Yearbook of Forest Products*. Food and Agriculture Organisation, Rome.
- IPCC 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 3: Reference Manual*. Houghton J.T., Meira Filho L.G., Lim B., Treanton K., Mamaty I., Bonduki Y., Griggs D.J., Callender B.A. Bracknell: UK Meteorological Office.

- IPCC 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry (LULUCF)*. Penman, J. *et. al*. (Ed.) Japan: Published for the IPCC by the Institute for Global Environmental Strategies.

Annex 3

LEGAL TITLE TO THE LAND AND INVOLVEMENT OF LOW-INCOME COMMUNITIES

See the legal documents titled *Transmission Décision n°0210*, *Attestation de Vacance de Terrain*, *Acte de Vente* and *Acte Notaire* here in attachment.

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REPUBLIQUE DEMOCRATIQUE DU CONGO

PROVINCE ORIENTALE
TERRITOIRE D'IRUMU
COLLECTIVITE DE WALESE – VOKUTU
GROUPEMENT DE VANDAVILEMBA
PINZILI

Le Chef de Groupement

ATTESTATION DE VACANCE DE TERRAIN

Je soussigné, **Adro MELE TONI,** Chef de Groupement **de BANDAVILEMBA,** Collectivité **WALESE- VOKUTU,** Territoire d'IRUMU, atteste par la présente que le terrain situé en **SAMBOKO-ITURI** (rivière), de LUNA à 40 km vers Ouest, de la route principale allant vers KOMANDA, couvert de la forêt, est vacant de 90.000 hectares.

J'atteste en outre que **la Société LAPLANETE SPRL** est représentée par son gérant Monsieur Placide NZUNZU est autorisé à occuper ledit terrain et exploiter la forêt s'y trouvant pour une durée indéterminée.

A foi de quoi, je signe conjointement **avec** elle, la présente.

Fait à PINZILI II, le 26/10/2007

La Société LA PLANETE SPRL

Mr Placide NZUNZU (Le Gérant)

Le Chef de Groupement de BANDAVILEMBA
Adro MELE TONI

Vue et approuvé :

L'Administrateur du territoire d'IRUMU
ZITONO AKHOTA
Le chef de collectivité WASELE – VOKUTU :
AKHAUME FENZI Antoine

- Le chef de Localité :
  MITONO AKOTA P.O
- Le chef coutumier

Denis KASELWA LESE

REPUBLIQUE DEMOCRATIQUE DU CONGO

Pinzili, le 31/10/2007

PROVINCE ORIENTALE
TERRITOIRE D'IRUMU
COLLECTIVITE DE WALESE – VOKUTU
GROUPEMENT DE VANDAVILEMBA
PINZILI

Le Chef de Groupement

ACTE DE VENTE

Nous soussignés Chef de Groupement de BANDAVILEMBA, Collectivité de WALESE – VOKUTU, territoire d'IRUMU, Province Orientale, les chef coutumier et les gardes – coutume du terrain SAMBOKO – ITURU, reconnaissons avoir vendu à la société LA PLANETE SPRL notre étendu de terre couvert par une forêt d'une superficie de 90.000 hectares à 5 dollars par hectares.

Soit (5x90.000) = 450.000 $ (quatre cent cinquante mille dollars américains) échéancier dans 9 ans pour un montant de 50.000 $ (dollars américains cinquante mille) par ans.

Le montant perçu pour cette année est de **50.000 $** (***dollars américains cinquante mille).***
Le reste à percevoir est de **400.000 $** (***quatre cent dollars américains***).

L'Acheteur
La **Société LA PLANETE SPRL**
Mr Placide NZUNZU (Le Gérant)

Les Vendeurs

- Le chef de groupement BANDAVILEMBA :
  Adro MELE TONI
- Le chef de collectivité WASELE – VOKUTU :
  AKHAUME FENZI Antoine
- Le chef de Localité :
  MITONO AKOTA
- Les chefs et les gardes de coutumes :

  Denis KASELWA LISE
  TIPWALA AOKWA
  Zefuré ULANGI MWAMI
  BONGELI TONI

RÉPUBLIQUE DÉMOCRATIQUE DU CONGO

PROVINCE ORIENTALE
VILLE DE KISANGANI
OFFICE NOTARIAL

ACTE NOTARIE

L'an deux mil sept, le premier jour du mois de novembre***
Nous soussignés **Antoine KOGATE - KOLE**, Notaire de la ville de Kisangani et y résidant, certifions que **l'attestation de vacance de terrain** situé à SAMBOKO – ITURI (rivière), ... Luna à 40 Km vers ouest de la route principal de Komanda nous a été présenté ce jour à Kisangani par **

Messieurs : **Adro MELE TUNI,** le Chef de Groupement de BANDAVILEMBA, territoire d'IRUMU, collectivité de WASELE – VOKUTU ; ***

Comparaissant en personne en présence de Messieurs ZITONO BAKOTA, Administrateur du territoire d'IRUMU et BONGOMBE KITU Alain Agents de l'Administration, témoins instrumentales à ce requis réunissant les conditions exigées par la loi**

Lecture du contenu de l'acte susdit a été faite par nous Notaire au comparant et aux témoins Le comparant pré qualifié a déclaré devant nous et en présence desdits témoins que l'acte susdite! qu'il est dressé renferme bien l'expression de leur volonté , qu'ils sont seuls responsables de toute contestations pouvant naître de l'exécution des présentes sans évoquer la complicité de l'Office Notarial ainsi que le notaire.***

En foi de quoi le présent a été signé par nous Notaire, les comparants et les témoins revêtus du ***

Sceau de l'Office Notarial de la Ville de Kisangani

SIGNATURE DU COMPARANT
Adro MELE TUNI

AKAUME FENZI Antoine

SIGNATURE DÙNQTAIRE
Antoine KOGATE - KOLE

SIGNATURE DES TEMOINS

ZITONO BAKOTA

BONGOMBE KITU Alain

DROITS PERÇUS : Frais d'acte **250.000 FC** ***
Suivant Quittance n°GF **32407** en date de ce jour**
ENREGISTRE par nous soussignés, ce 1er novembre***
L'an deux mil sept à l'Office Notarial de la ville de Kisangani**

Sous le numéro **078.122** Folio **018-145** Volume/MXIV***

LE NOTAIRE
Antoine KOGATE

Pour expédition certifiée conforme**
Coût • 150 000 FC***
Kisangani 1er Novembre 2007**

LE NOTAIRE
Antoine KOGATE - KOLE

000218369

REPUBLIQUE DEMOCRATIQUE DU CONGO

Pinzili, le 31 /10 /2007

PROVINCE ORIENTALE
TERRITOIRE D'IRUMU
COLLECTIVITE DE WALESE – VOKUTU
GROUPEMENT DE VANDAVILEMBA
PINZILI

Le Chef de Groupement

Transmis copie pour information à :

- A Son Excellence Monsieur le Président de la République
  (Avec mes hommages les plus déférents)
- A Son Excellence Monsieur le Ministre de l'Environnement
- Monsieur le Secrétaire Général de l'Environnement
- Monsieur le Directeur – Chef de Service de la Protection de l'Environnement forestier et la de Centralisation

  (Tous) à Kinshasa – Gombe

- Son Excellence Monsieur le Gouverneur de la Province Orientale
  à Kisangani.

Objet : **Transmission Décision n°0210**

A Monsieur l'Administrateur Gérant de la Société la PLANETE SPRL
à Kinshasa – Gombe

Monsieur l'Administrateur Gérant,

J'ai l'honneur de vous transmettre, en annexe, la Décision référencée en marge portant l'octroi du terrain précité au profit de votre société.

Veuillez agréer, Monsieur l'Administrateur Gérant, l'assurance de ma considération distinguée.

Adro M[illegible] – TUNI
Le Chef de Groupement BANDAVILEMBA