

Yaligimba Concession HCV Assessment

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Feronia

Prepared by



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For

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Independence

Leigh-Ann de Wet has no connection with Feronia, and is not a subsidiary of any kind of Feronia. The remuneration for services by DWE in relation to this report and associated studies is unrelated to approval by decision-making authorities responsible for authorization of any Feronia activity. Leigh-Ann de Wet has no interest in secondary developments as a result of authorization of this proposed project. The percentage of work received directly or indirectly from Feronia in the last twelve months is 0%.

Scope and Purpose of Report

The scope and purpose of the report is described in the section on Terms and Reference within this report.

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List of Acronyms and Abbreviations

CARPE	Central Africa Regional Program for the Environment
CBD	Convention on Biological Diversity
CPO	Crude Palm Oil
DRC	Democratic Republic of the Congo
ESG	Environmental, Social and Governance
ESMP	Environmental and Social Management Plan
FACET	Forêts d’Afrique Centrale Evaluées par Télédétection
FGD	Focus Group Discussions
GPS	Global Positioning System
ha	Hectares
HCV	High Conservation Value
HCVRN	High Conservation Value Resource Network
IFC	International Finance Corporation
IFL	Intact Forest Landscape
IUCN	International Union for the Conservation of Nature
kms	Kilometres
m	Metres
MU	Management Unit
NTFP	Non-timber forest product
PHC	Plantations et Huileries du Congo
PKO	Palm Kernel Oil
RSPO	Round Table on Sustainable Palm Oil
RTE	Rare, threatened or endangered
SSC	Species of Special Concern
WRI	World Resources Institute
WWF	World Wide Fund for Nature

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1 Introduction and background

This High Conservation Value (HCV) assessment was conducted for Feronia PHC (Feronia) for the Yaligimba oil palm concession located 20kms from the northern bank of the Congo River in the Equateur province of the Democratic Republic of the Congo (DRC). Feronia operates three oil palm concessions within the DRC, the oldest of which was established in 1911 as the Plantations et Huileries du Congo (PHC). All three were bought from Unilever plc in 2009 and are currently being rehabilitated as Feronia PHC.

Oil palm activities within the concession areas include plant nurseries, plantations, processing mills, storage, and shipment facilities (all products including crude palm oil (CPO) and palm kernel oil (PKO) are transported by barge to local refineries in Kinshasa). Yaligimba was established in the 1930s, with a concession area of 30 000 hectares (ha) of which 8 000ha is planted. There is a permanent workforce of approximately 1096 people (which fluctuates), with a road network of 703kms, 21 schools, 1 hospital, 3 dispensaries and 1 health centre. Rehabilitation includes the gradual replacement of palm in excess of 25 years old ('legacy palm') and the planting of palms from the nursery. No greenfield areas have been cleared for the planting of oil palm since the plantation was taken over by Feronia.

1.1 Purpose of the High Conservation Value (HCV) Assessment

The purpose of this HCV assessment include the following:

- Identifying of any HCVs in the area of influence;
- Identifying areas of biodiversity;
- Mapping the HCVs or where no HCVs occur, the vegetation of the landscape;
- Recommending management and monitoring measures to avoid negative effects on any HCVs (if identified); and
- To comply with the Round Table on Sustainable Palm Oil (RSPO) scheme requirements.

The HVC assessment was for the concession and therefore included planted areas, and the wider landscape.

1.2 High Conservation Value

There are six high Conservation Values; the definitions have evolved since their first inception by the forest stewardship council (Brown *et al.* 2013). The definitions of these are provided in the Table 1.1:

Table 1.1: Definitions of the six High Conservation Values (HCVRN_ALS_004).

HCV	Definition
HCV 1: Species diversity	Concentrations of biological diversity including endemic species, and rare, threatened or endangered species (RTE), that are significant at global, regional or national levels.
HCV 2: Landscape-level ecosystems and mosaics	Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.
HCV 3: Ecosystems and habitats	Rare, threatened, or endangered ecosystems (RTE), habitats or refugia.
HCV 4: Ecosystem services	Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.
HCV 5: Community needs	Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.
HCV 6: Cultural values	Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/ sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.

Country-specific HCVs have been documented and have been used by Digby Wells for this assessment (The Proforest Initiative 2012: Table 1.2).

Table 1.2: Country-specific HCV categories (The Proforest Initiative 2012).

HCV	DESCRIPTION	
1	Diversity of species:	Concentrations of biological diversity – including endemic species, rare species, vulnerable or in danger, world importance, regional and national importance
1.1	Protected zones	
1.2	Concentrations of species	Vulnerable species, threatened and endangered
1.3	Concentrations of endemic species	

HCV	DESCRIPTION	
1.4	Zones of concentrations seasonal species	
2	Ecosystem and mosaics at a landscape scale:	Vast ecosystems at a landscape scale and mosaics of ecosystems which are important at an international, national or regional level
3	Ecosystems and habitats:	Ecosystems, habitats or rare refuge zones which might be threatened or endangered
4	Critical ecosystem services:	Fundamental Ecosystem Services in critical situations
5	Community Needs:	Sites and fundamental resources for the satisfaction of the essential needs of local communities or native peoples identified
6	Cultural value:	Sites, resources, habitats and landscapes of cultural, archaeological or historic importance at a national or international level.
6.1	Important cultural, archaeological, historical values	At a national or international level
6.2	Important cultural, ecological, economic or religious/sacred values	For the local or native peoples

HCV assessment is required for the Round Table on Sustainable Palm Oil (RSPO) through their Principle 5 and Principle 7, and supported by Principles 1, 2 and 6 (Brown *et al.* 2013). The 6 HCVs relevant in the RSPO context, and the International Finance Corporation (IFC) Performance Standards (PS). The HCV categories fall into three of the Performance Standards (PS), including:

- Performance Standards 5: Land acquisition and involuntary settlement;
- Performance Standard 6: Biodiversity conservation and sustainable management of living natural resources; and
- Performance Standard 8: Cultural heritage.

2 Description of the assessment area

In order to conduct an HCV assessment, different scales of information and data sources are required (Brown *et al.* 2013). These range from global, to regional and national, to local scales. Brown *et al.* states that: “...different level of information and data sources will be useful at different scales. For example, at the global or regional scale very high level, coarse filter information such as global lists and priority landscapes can be useful. As one moves down to the national level, looking at specific country-level values and data sets will be useful. Finally, since the HCV assessment will ultimately be conducted at the site scale (e.g. Management Unit (MU) or plantation), information at the local scale will include field survey data and existing studies.” This is illustrated by Figure 2-1, which is taken directly from Brown *et al.* (2013). Scales used can be global (such as IUCN red data lists, Ramsar sites, Important Bird Areas and Alliance for Zero Extinction sites), regional (such as the WWF Ecoregions and associated data, CARPE landscapes), national (such as the presence of national protected areas. More local scale data includes the site surveys and field work, as well as any available literature on the area of influence.



Figure 2-1: Schematic drawing of the relationship between the different scales of information and data sources.

2.1 Yaligimba Area of Influence

The Yaligimba concession is located within the Congo Basin, in the DRC and in the Equateur province. The concession is considered as part of the wider landscape as per HCV requirements (Brown *et al.* 2013). As such, protected areas, regional biogeography and other aspects have been taken into account.

Box 1: Spatial Identification

Regional – The region is the area that is most similar in terms of biodiversity, with boundaries defined by geomorphological features. The region into which the concession falls is the Congo Basin.

National – The borders of the DRC define the National area. This is a political boundary and not often useful in terms of biodiversity and habitats.

Area of Influence – The study area is an area on a landscape scale defined by the HCV assessor to include the plantations, concession and any other relevant landscape-level attributes. These attributes may include large areas of contiguous forest, for example.

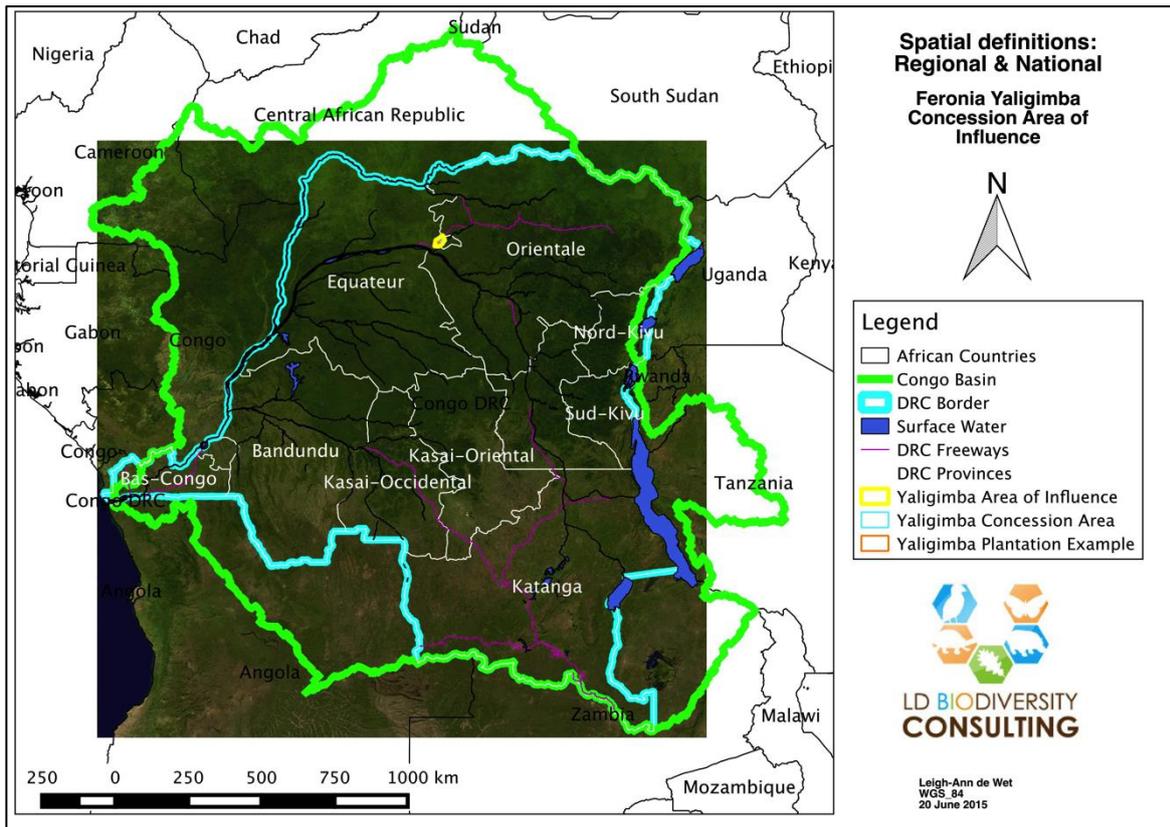
Concession – The concession is the total area for which Feronia holds title deeds. This may include villages, farmlands, and forest areas.

Plantation – The areas in which oil palm is planted. Roads, rivers, forests or villages may border each of these areas.

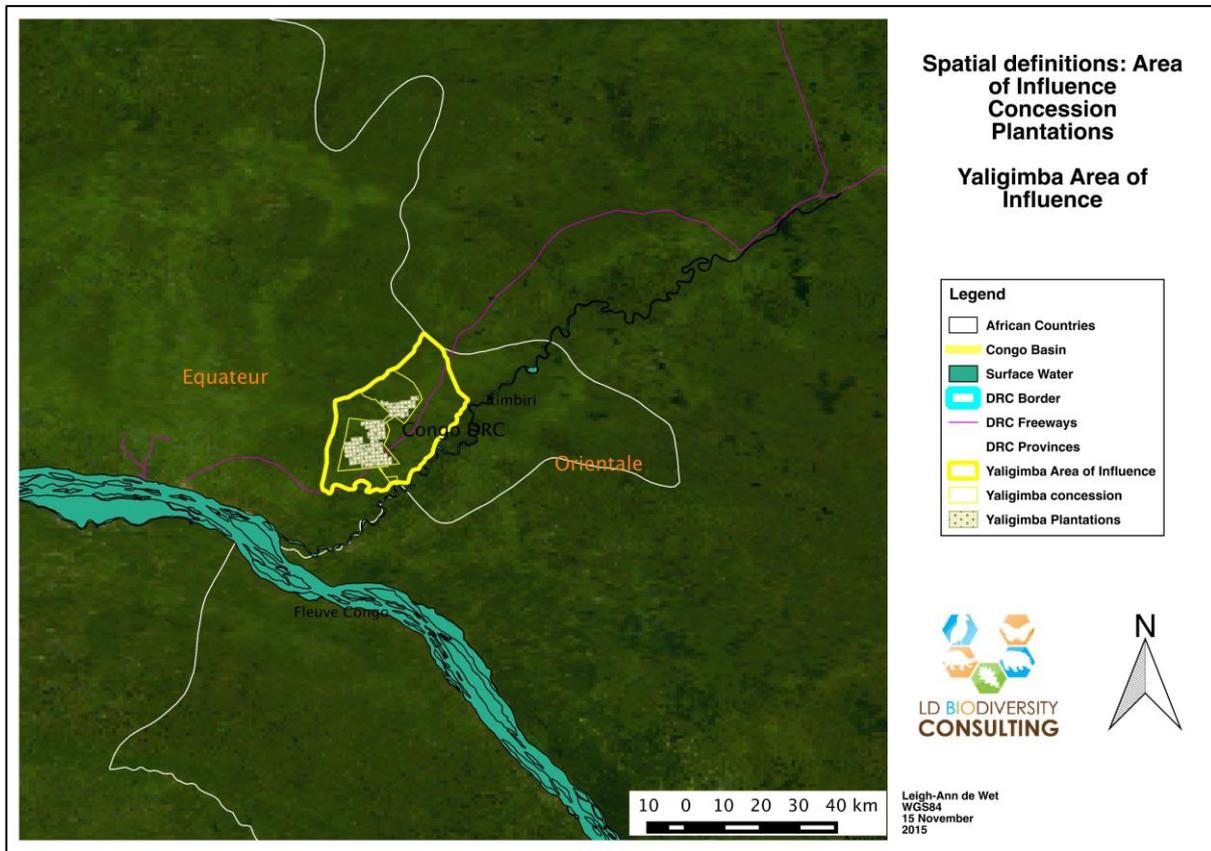
The area of influence of the project is that area that may be affected by the project, including activities such the development of roads, displacement of resources use by local communities, or areas affected by hydrology. The Yaligimba area of influence has been described using habitat boundaries. The west and north of the site is bordered by a river, which forms a clear natural geographical barrier. To the south and east of the site, there is a clear natural barrier caused by large areas of natural forest, this forms the boundary on this side.

The various spatial levels are indicated in and Box 1.

The villages of the area of influence practice subsistence farming with traditional rotational cropping and slash-and-burn. The result is a matrix of secondary forest and agriculture with areas of oil palm plantations.

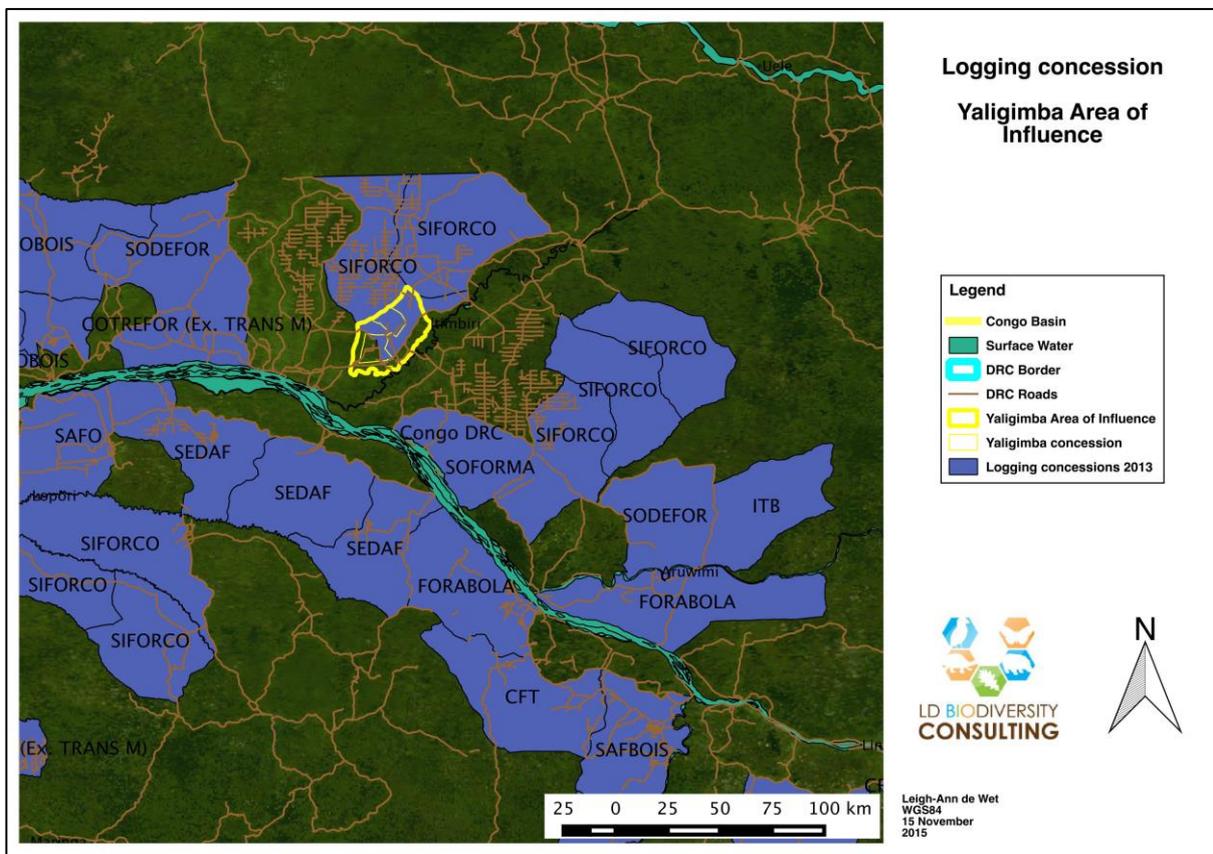


Map 2-1: Spatial definitions: Regional and National



Map 2-2: Spatial definitions: Area of influence, concession and plantation

The areas surrounding the Feronia Yaligimba concession (for which Feronia owns and hold the title deeds) show planned land uses that include both logging and mining concessions. This is information gathered by the World Resources Institute, in 2013 for the DRC (Map 2-3). The area of influence overlaps with two commercial logging concessions, 025/04 SIFORCO to the north and 002/89 SIFORCO to the north-east of the site both of which have been abandoned and given back to the state. These concessions have been logged, with a network of logging roads running throughout the concessions as mapped by WRI. Other logging concessions in the vicinity are also well logged with disturbance heavy for the local area (according to the database at WRI: <http://www.wri.org/applications/maps/forestatlas/cod/index.htm#v=atlas&l=fr&init=y>). These logging concessions were initially developed in the 1800s and although still present in the database and important to note as part of the wider landscape-level.



Map 2-3: Listed logging concessions and their proximity to the Feronia Yaligimba area of influence.

2.2 Biodiversity

Generally, biodiversity information for the Democratic Republic of Congo is limited compared to other countries in which oil palm is grown. As a result, HCV determinations are based on limited desktop information and are heavily reliant on field investigations and expert opinion.

2.2.1 Regional Biodiversity

The Yaligimba concession is located within the Tropical and Subtropical Moist Broadleaf Forests (WWF 2015). Yaligimba is located within the North-eastern Congo Basin Moist Forests ecoregion (Map 2-4). The Yaligimba concession area is located within the *Cuvette Centrale*, an area including and surrounding the Congo River, within the Congo River and Flooded Forests Global 200 Freshwater Ecoregion (Map 2-5) (Thieme *et al.* 2005). The major aquatic habitat type is tropical floodplain rivers with wetland complexes. The *Cuvette Centrale* has topography that is typically almost flat, in the Yaligimba area of influence, relief is gentle and up to 400m above sea level. The climate of the region is equatorial and wet with rainfall consistently almost year round. The average annual rainfall is between 1,500 mm and 2,000 mm per annum with mean annual temperatures of 24 °C (Thieme *et al.* 2005).

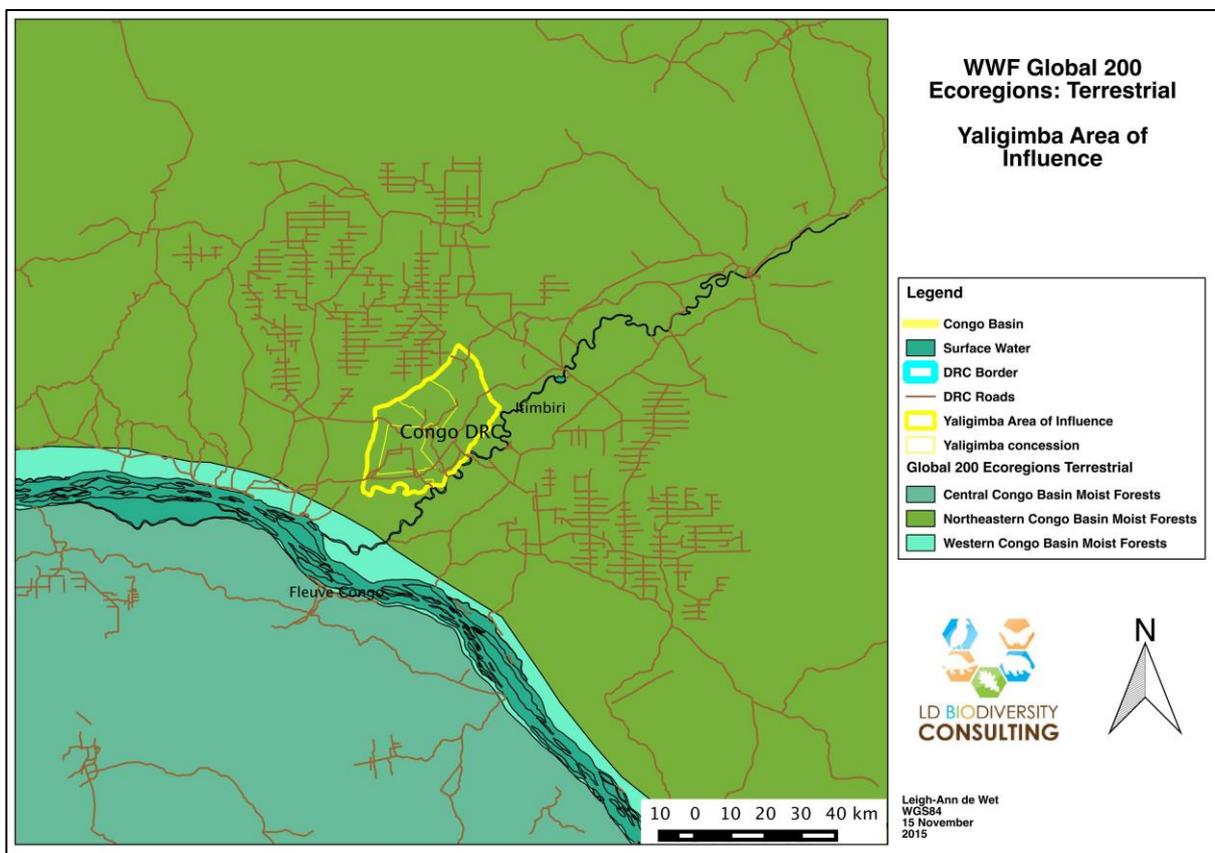
The *Cuvette Centrale* contains a variety of habitats, which include: open waters, small streams, coves, and meadows of aquatic vegetation, permanent swamps and extensive floodplains (Theime *et al.* 2005). Seasonally flooded riparian zones results in permanent swamp forests, which have few dominant species, but have rich floral diversity (Theime *et al.* 2005).

According to Abel *et al.* (2008), the *Cuvette Centrale* is host to a rich fish fauna with approximately 300 different fish species and 12 known taxa that are specifically endemic to the *Cuvette Centrale*. It should be noted that although 300 taxa are expected to be present, only 240 species have been documented. This is due to the limited number of biological studies, which have been conducted in this area. In general, the *Cuvette Centrale* is considered to have a limited number of threatened taxa (Brooks *et al.* 2011). The central factor contributing to the low number of threatened taxa is based on the remote locations of tributaries of this area.

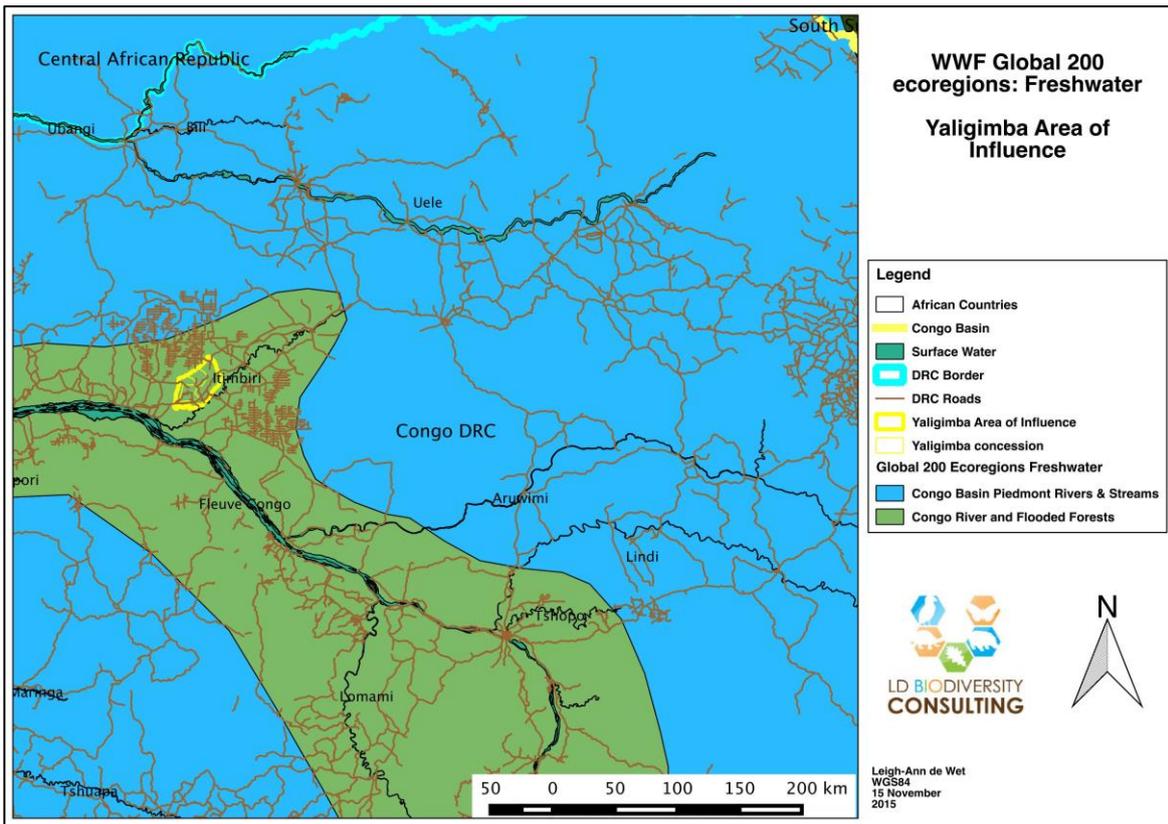
There are four protected areas within 200km of the centre of the area of influence and include Rubi-Tele, to the east, Yangambi to the south east, Lomako-Yokokala to the south west and Bili-Uere to the North. A Central African Regional Program for the Environment (CARPE) landscape is found over 200km to the south the area of influence, the Maringa-Lopori-Wamba landscape (Map 2-7). CARPE landscapes are developed with the objective to “reduce the rate of forest degradation and loss of biodiversity in the Congo Basin by increasing local, national, and regional natural resource management capacity” (CARPE 2015). These landscapes are important as they are used in the national interpretation of the HCV categories and automatically fall into HCV 2 (Pro Forest Initiative 2012). The CARPE program manages the landscapes as key biodiversity areas and they form priority

conservation targets (CARPE 2015). The Maringa-Lopori-Wamba landscape closest to Yaligimba is covered by moist dense forests and comprises relatively intact primary forest, both moist forests and floodplain or swamp forests (CARPE 2015).

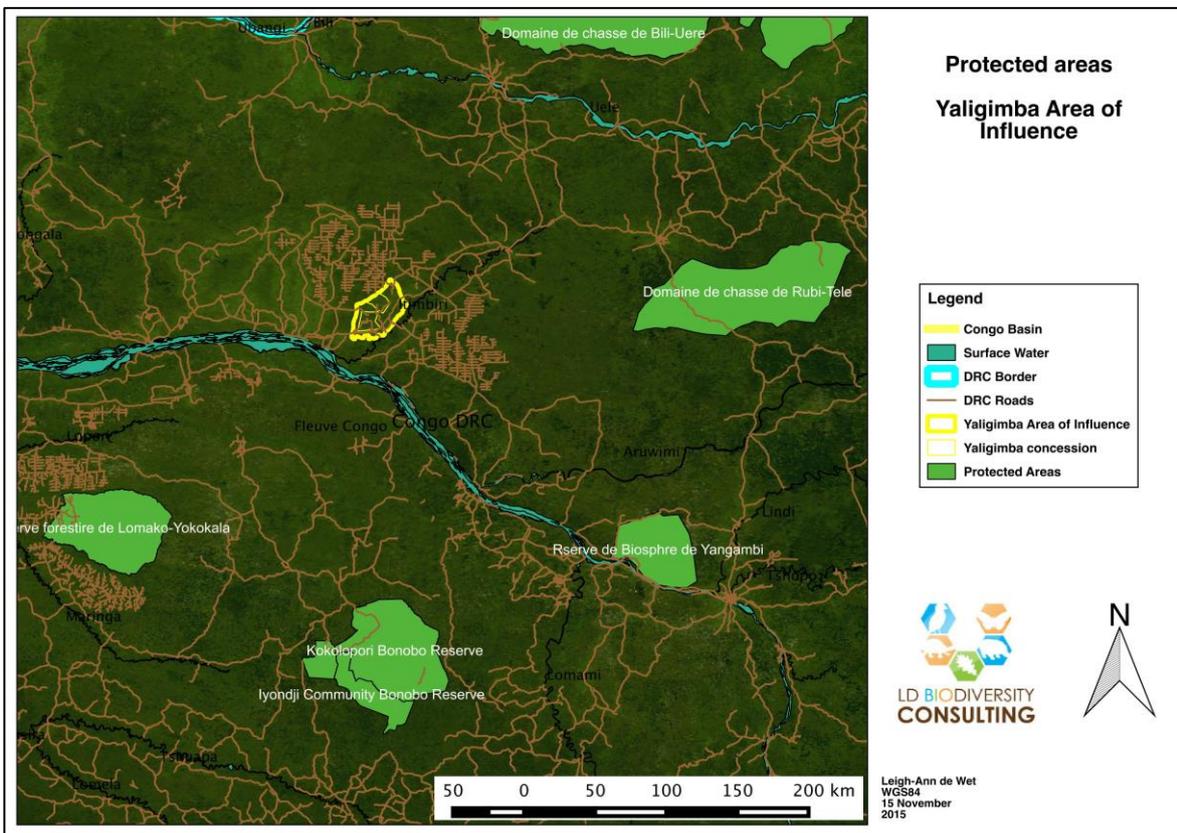
“An Intact Forest Landscape (IFL) is an unbroken expanse of natural ecosystems within the zone of current forest extent, showing no signs of significant human activity, and large enough that all native biodiversity, including viable populations of wide-ranging species, could be maintained.” (IFL 2014). IFLs are important for HCV classification, as they automatically form HCV 2 in the DRC (The Proforest initiative 2012). Several such landscapes are present surrounding the Yaligimba area of influence, with none of them occurring in close proximity (Map 2-8).



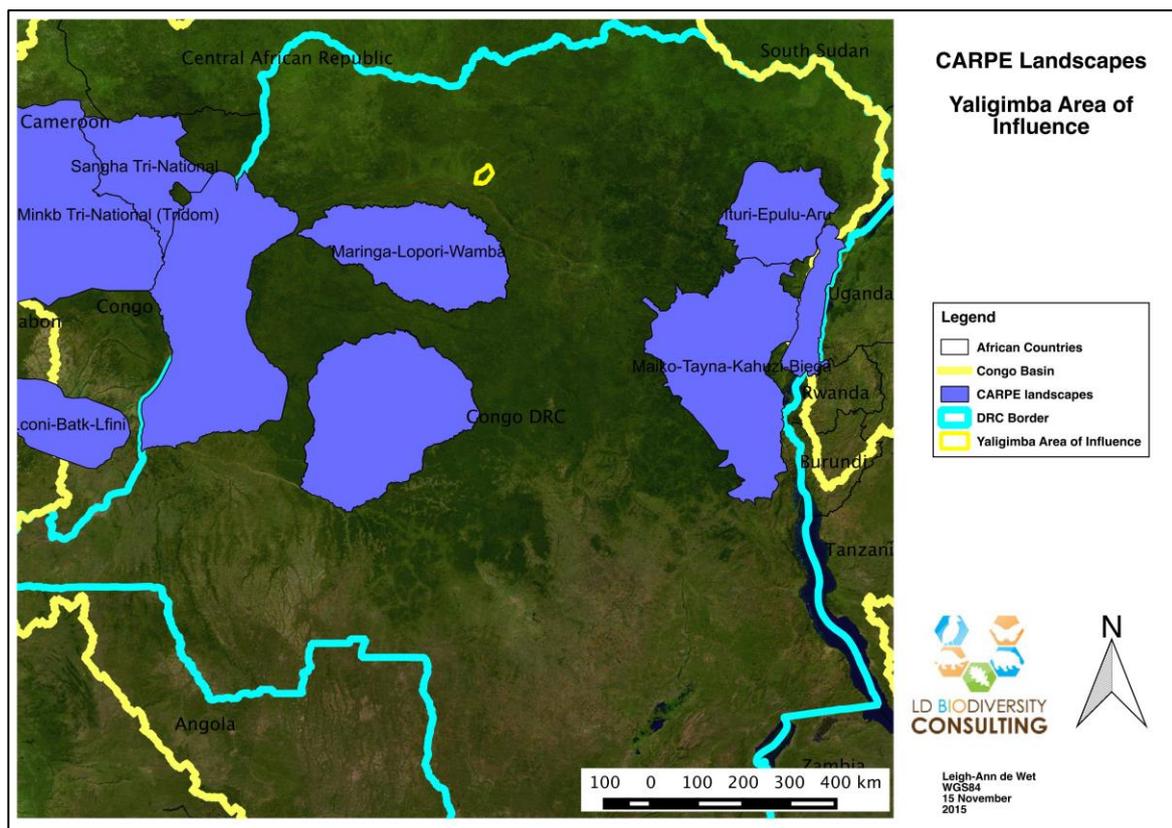
Map 2-4: WWF Global 200 Ecoregions: Terrestrial



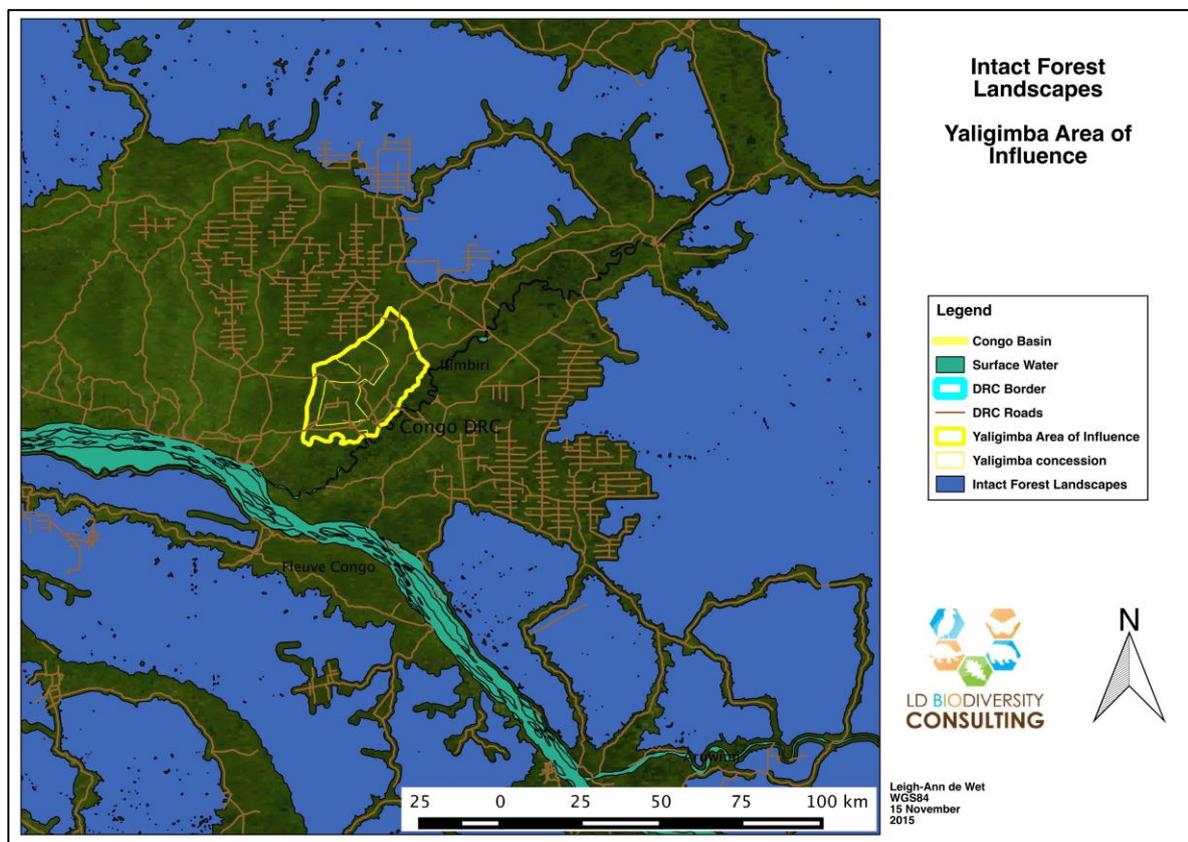
Map 2-5: WWF Global 200 Ecoregions: Freshwater



Map 2-6: Protected areas in relation to the Feronia Yaligimba area of influence



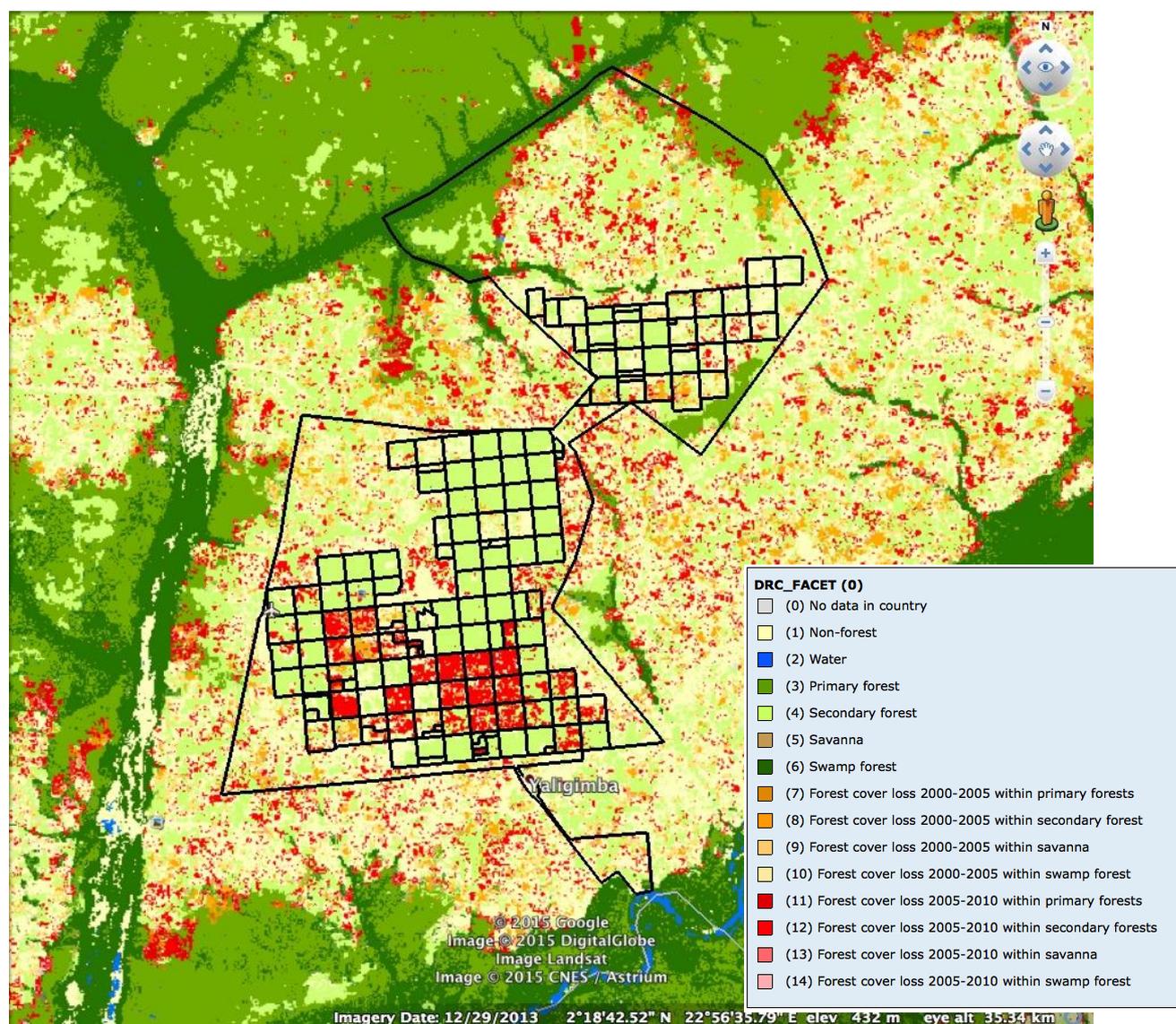
Map 2-7: CARPE landscapes in relation to the Feronia Yaligimba area of influence



Map 2-8: Intact Forest Landscapes and their proximity to the Yaligimba area of influence

2.2.2 Vegetation and Flora of the Yaligimba Area of Influence

Vegetation and forest cover loss has been mapped by FACET (Forêts d’Afrique Centrale Evaluées par Télédétection). Its goal is to monitor the changes in forest over time using satellite data. The atlas available classifies the vegetation of the entire DRC, the portion which covers the Yaligimba area of influence is presented in Map 2-9. The Yaligimba area of influence is primarily transformed, with very little natural forest present inside the area of influence.



Map 2-9: FACET forest map of the Yaligimba area of influence

At this stage it is important to define some terms associated with vegetation and habitats. The habitats assigned to the vegetation of the area of influence are those described by the IFC. IFC PS6 outlines two different categories of habitat (a third one, Critical Habitat, can be formed from either of the two but is not determined here), which are defined in Box 2-1.

The methodology used for determining the habitats into which the vegetation falls is described in Figure 2-2.

Box 2-1: forest definitions

“Modified Habitat

11. Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area’s primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands.

Natural Habitat

13. Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin. And/or where human activity has not essentially modified an area’s primary ecological functions and species composition.

15. In areas of natural habitat, mitigation measures will be designed to achieve no net loss of biodiversity where feasible. Appropriate actions include:

- Avoiding impacts on biodiversity through the identification and protection of set-asides;
- Implementing measures to minimize habitat fragmentation, such as biological corridors;
- Restoring habitats during operations and/or after operations; and
- Implementing biodiversity offsets.”

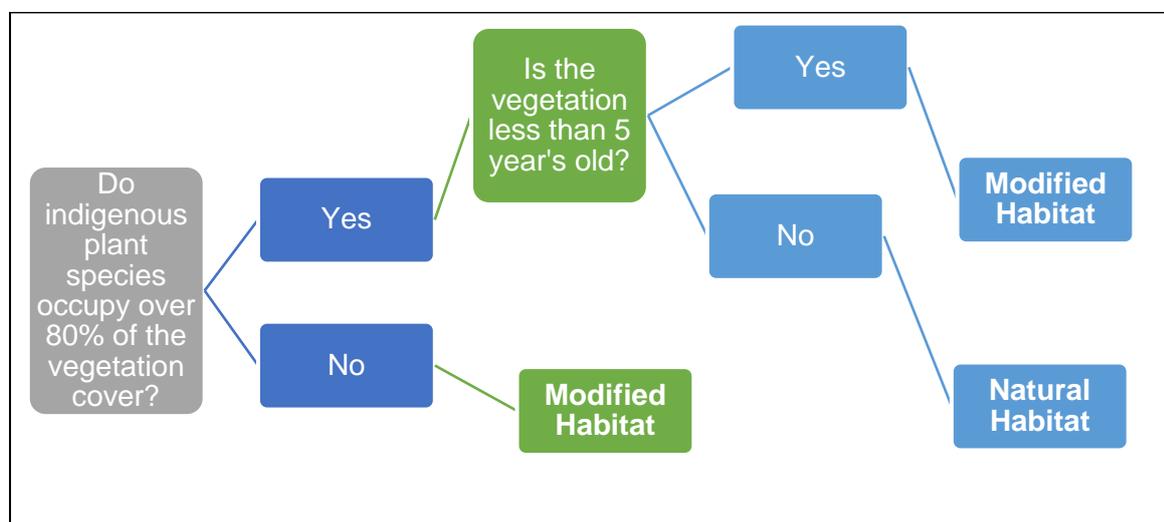


Figure 2-2: Decision tree for determining IFC Habitat type within the Feronia area of influence.

A vegetation survey conducted by Digby Wells from the 24th to the 29th of January 2015 identified a mosaic of different vegetation types within the area of influence (Map 2-). The different vegetation types comprise a mosaic of cultivated land and secondary forest, which is typical surrounding the settlements of the region due to the nature of the subsistence agriculture (slash and burn) practiced by the local communities. The disturbed nature of the

area of influence and surrounds, probably due to the commercial logging activity in the general area has resulted in only tiny remnants of very disturbed natural forest within the general area.

Although some biodiversity is found within the plantations themselves, the primary habitat for species richness is the secondary forest within the study area. It is here that the majority of species of trees, other plants, avifauna and mammals are found. Forest within the study area can be divided into four main types: dryland forest, riparian forest, swamp forest and disturbed areas. Typical species of each of the habitat types are ubiquitous, with less typical species forming the difference across the ecoregions.

Dryland forest occurs in areas that are not inundated, either permanently or seasonally and is limited in extent throughout the study area. Much of the dryland forest existing in the remainder of the study area is secondary in nature. A patch of disturbed forest exists in the centre of the plantation. Disturbance is mainly due to past commercial and subsistence logging, which is evidenced by the lack of large and old trees. This forest tends to be tall, with trees reaching heights of 20 to 30 meters (m) with some emergent crowns up to 40m. The vegetation structure is complex, with the upper canopy formed by the emergent trees and the main canopy formed by the bulk of the tree species. There is then a medium canopy height formed by smaller trees of approximately 10m, and a short canopy height formed by small trees 5 to 7m. There is then a shrub layer, which is on average 2 to 3m and the herbaceous layer, which is on ground level and comprised of plant species that survive in very low light. In areas where there are few trees, the herbaceous layer is composed of old farms, with cassava plants in abundance. It is at this herbaceous layer where ferns, mosses and low, large-leaved monocotyledonous species are found. Species found in this forest type include: *Afzelia africana*, *Albizia versicolor*, *Parkia bicolor*, *Pycnanthus angolensis*, and *Pericopsis elata*.

Riparian forest occurs throughout the study area along steep banks of rivers or streams. Although many of the same species from the surrounding swamp forest were found here, species characteristic of this habitat were found in areas that were less inundated (either seasonally or permanently). This forest type is tall, up to about 40m and occurs as a narrow strip, not usually exceeding 20m from the bank of the rivers. In the Yaligimba area of influence, the areas of Riparian Forest still existing are extremely disturbed and contain many ruderal species commonly found in disturbed areas with many swamp species. Often, the riparian forest comprises one tree surrounded by weed species.

The forest type is not particularly diverse, but does contain some diagnostic species including the rapid-growing bamboo (*Bambusa vulgaris*). Very typical of this vegetation type are two *Trichilia* species: *Trichilia retusa* and *Trichilia welwitschii*, as well as *Uapaca guineensis*. *Musanga* spp and *Anthocleista* spp are also commonly found in the riparian forest of the area of influence.

The swamp forest is typical of the study area and occurs in both seasonally and permanently inundated areas. This forest can range from being somewhat short (10 to 20m) to very tall (up to 30m) depending on the level of inundation (where land is seasonally inundated,

larger trees tend to grow). Swamps are restricted to the shallow banks of rivers and streams and due to the low-lying nature of the study area, are very common. Overall, typical species in the swamps include the dominant *Raphia* palms, along with trees with stilt buttresses such as *Uapaca* species and relatively small monocotyledonous species. Also found in swamp forests are *Bambusa vulgaris*, *Anthocleista* sp, *Macaranga* sp and *Musanga* sp.

Areas of plantation, or other disturbed areas also have their own suite of species. Disturbed areas are any areas that have been modified, including plantations. They typically contain weeds as well as fast-growing ruderal indigenous species that would normally colonize gaps in the forest caused by tree falls. Common species of these areas include: *Bambusa vulgaris*, *Canna indica*, *Chamaecrista pratensis*, *Chromolaena odorata*, *Commelina africana*, *Costus afer*, *Macaranga monandra*, *Macaranga saccifera*, *Mimosa invisa*, *Setaria megaphylla*, *Sida acuta*, and the very common *Alchornia cordifolia*.

2.2.3 Fauna of the Yaligimba area of influence

Box 3: Endemic and Rare, Threatened and Endangered Species (RTE). Taken directly from Brown *et al.* 2013.

Rare is scale dependent and includes species that are

- Naturally rare, existing only at very low densities in undisturbed habitat, or
- Rare because of human activities e.g. habitat destruction, overhunting, climate change
- At the limit of their natural distribution (even if they are common elsewhere)

Threatened and endangered species can include species classified by IUCN as Vulnerable (VU), Endangered (EN) and Critically Endangered (CR) at a global or regional level, or whose trade is regulated under international agreements (e.g. CITES), as well as nationally protected species. IUCN Red Listing remains incomplete and many RTE species have not yet been assessed by the IUCN Species Survival Commission. In some countries, especially those lacking national IUCN red lists or nationally protected species lists, expert consultation is needed to learn if any such species are present.

Endemic species are those which are only found within a restricted geographical region, which may range from a unique site or geographical feature (such as an island, a mountain range or river basin), to a political boundary such as a province or country. Endemic and range-restricted species are particularly vulnerable to threats as they have a limited distribution and may have smaller populations than widespread species. Endemism only generally triggers HCV status if the populations is also nationally significant.

Although the forests of the area contain some habitat (though heavily disturbed) for various mammal species, the field study conducted by Digby Wells from the 24th to the 29th of January indicate that the mammal species richness for the area of influence is low. Reasons postulated include excess of hunting for bush meat by the local villagers as well as historical logging and habitat destruction by commercial logging companies and the local community. Few mammal species were recorded from the area of influence and included the Straw-coloured Fruit Bat (*Eidolon helvum*), the Hammer Bat (*Hypsignathus monstosus*), The Egyptian Fruit Bat (*Casinycteris argyrenis*), Congo Rope Squirrel (*Funisciurus congicus*), Thomas's Rope Squirrel (*Funisciurus anerythrus*), The Giant Otter Shrew (*Potamogale velox*), the Slender

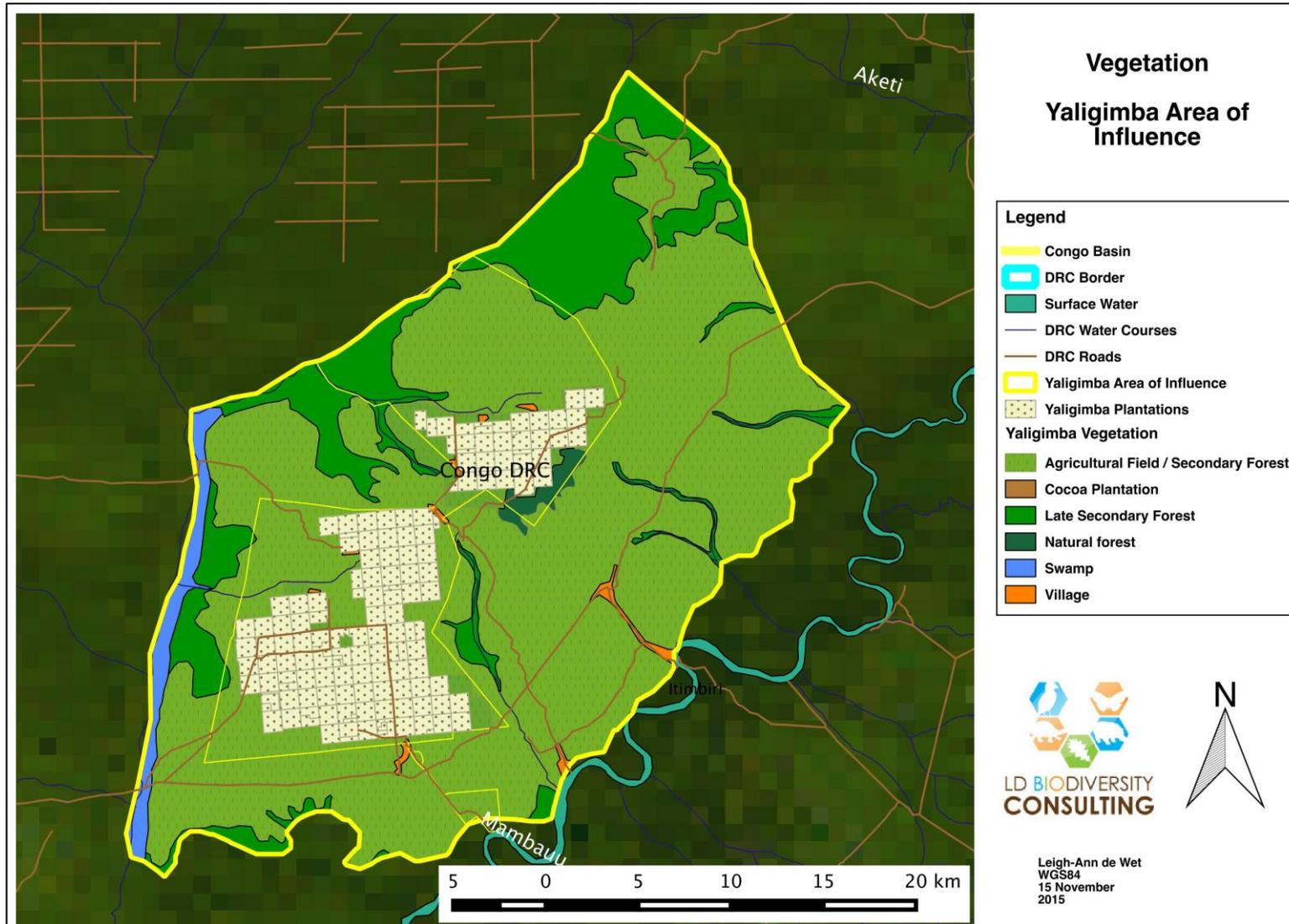
mongoose (*Herpestes sanguinea*) and the Marsh Mongoose (*Atliax paludinosus*). There were

signs of the presence of Red River Hog (*Potamocheorrus porcus*) and the Red Tailed Monkey (*Cercopithecus ascanius*).

Of the 76 bird species recorded from the study area, two of these have not been recorded from the general area before the Digby Wells study according to the reference materials used: Sinclair and Ryan (2008) and Van Perlo (Revised 2012): African Rail (*Rallus caerulescens*) and the Little Egret (*Egretta garzetta*). The African Grey Parrot (*Psittacus erithacus*) a species listed as Vulnerable according to the IUCN (ver 3.1) was also recorded.

The findings of the study present the Yaligimba Concession to be moderate species richness and habitat provision in terms of herpetology. Secondary forest (especially with streams), Swamp Forest and Riverine Forest Habitats are regarded to have the highest ecological sensitivity due to the moderate to high in species richness and habitat provision. These areas are all regarded to have moderate to high conservation value for herpetological species.

Aquatic ecology of the site indicates that the water quality is what would be expected for a tropical system. Water quality impacts were visible near human settlements along streams. There was some modification of channels but not enough to severely affect the river functioning. The extent of the submerged floodplain and main stem of the Loeka River was viewed to be near pristine due to the inaccessible conditions these regions create. Despite the limited nature of the individual assessed instream impacts, present a moderately modified instream habitat in the Itimbiri tributaries. The riparian habitat of the Itimbiri tributaries had large sections of land where indigenous vegetation removal had occurred, with many areas cleared of large trees. Exotic vegetation such as *Eichhornia crassipes* were also found to be present at the sites considered. The fish fauna of the rivers on and associated with the Yaligimba concession are probably not unique. The results of the qualitative assessment indicated wide use of several fish species, which are considered to be sensitive to water quality modification (Mormyridae) as well as tertiary predators such as *Hepsetus odoe*. The fish found at the study site are commons species, with no RTE taxa found in the area and a low degree of endemism.



Map 2-l: Vegetation in the Yaligimba area of influence

2.3 Social context of the study area

The estimated number of households on the area (see box 4) is 4,198 with an estimated population of 33,164 people in Yaligimba.

Box 4: Social Study Area

The social study area for the concession comprises the concession area and all of the settlements within it, as well as villages (provided by Feronia) located within an approximate radius of 5km from the concession boundaries.

Demographics indicate that the gender ratio of the population is relatively even (53% males, 47% females) with 50% of the population under the age of 16 (Figure 2-3). The population growth is high as a result of natural growth (rather than influx). Men head the majority of the households in Yaligimba (92%), with the average household having 7.9 members. Most couples have more than 2 children. There is little influx into the area, with the average

period of residence in the same area is 18 years, and new people have moved mostly from nearby settlements. People in the Yaligimba area are primarily Lingala speaking.

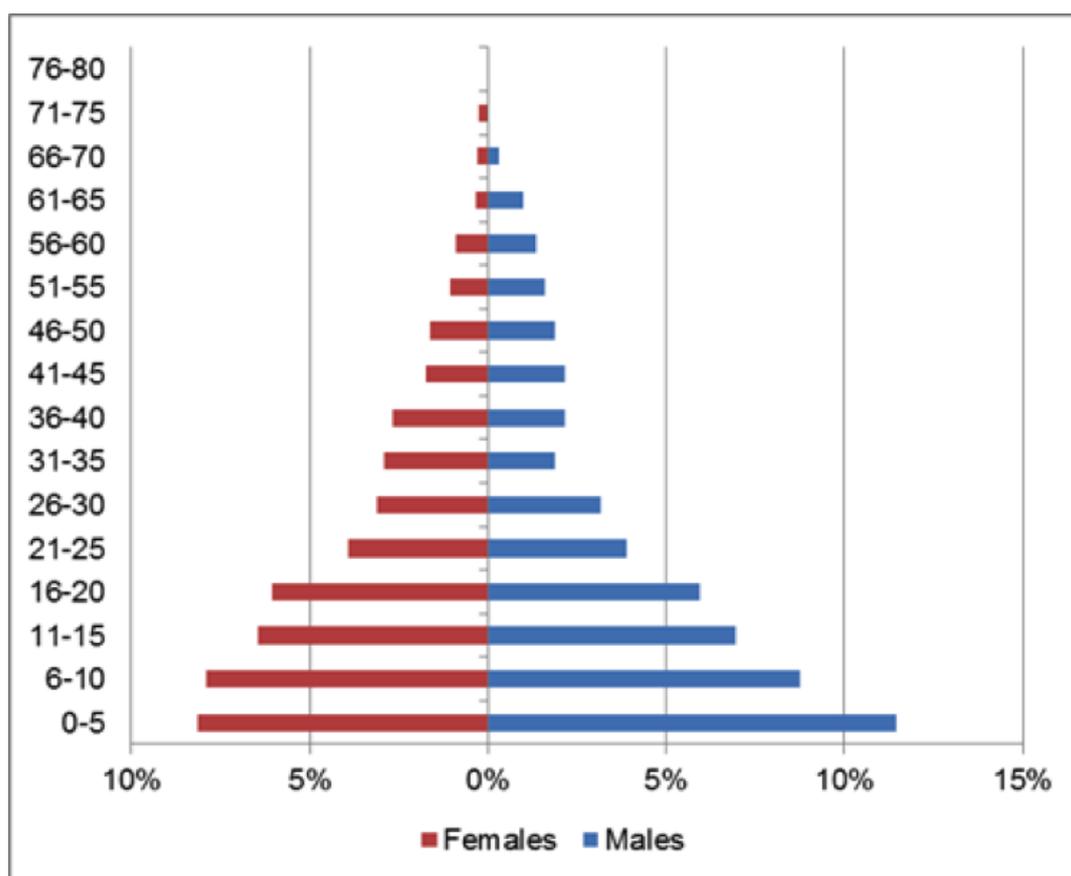


Figure 2-3: Population demographics indicating the number of people in each age class.

Overall, school attendance is low, with 67% from children from the ages of 6 to 13 currently attending school. About 41% of adults (over 20 years of age) have attended secondary school, with only 9% completing secondary school; literacy rates are about 86%. Livelihoods

(strategies that households and individuals employ to meet their economic and survival needs) include both cash income as well as subsistence. Overall, two-thirds of households rely on two or more types of livelihood. In Yaligimba, 67% of the households receive their primary income through employment by Feronia, with 9% through subsistence farming and 9% through sales of crops. Other sources of income important to individuals within the Yaligimba area and specific to forest resources include fishing, logging, firewood, medicinal plants and bush meat.

Agricultural lands are created by traditional slash and burn methods and rotational cropping. This means that fields are cultivated, and then left fallow for some time in order to gain back some of the nutrients. The regrowth is then cut and burned before the fields are planted again. Average age of fields in Yaligimba is 3.5 years, with the oldest having been cultivated for 25 years. 11% of the households in Yaligimba have left fields uncultivated to regain some productivity. Fields tend not to be abandoned.

Water is obtained from rivers and streams (78% of households) and sometimes from wells (21% of households) where rivers and streams are too far away. Water is stored in buckets but may be fetched up to three times a day. Most houses in the study area are constructed of clay and straw or corrugated iron and cement, with roofing of galvanized sheeting or iron the most common in Yaligimba. No electricity is supplied at the Yaligimba site with 99% of households using fire for cooking, and battery lamps, candles and fires are used for lighting. Transport is limited, with most people walking to services such as schools or hospitals. About 20% of the households have a mobile phone, with very few having a working radio. Although health care facilities are well used, approximately 37% of the households have used traditional healers at some time. Food security is not good, with food shortages reported from Yaligimba in 33% of households at some time in the past year.

Reliance on natural resources is extremely high, with the most commonly harvested resource being firewood, followed by forest food products (not meat). Table 2.1 below indicates the prevalence of reliance different types of natural resources. Figure 2-4 below shows the frequency with which these natural resources are harvested.

Table 2.1: Prevalence of reliance on natural resources.

Type of natural resource	Prevalence of reliance (%)
Firewood	99
Forest food products (excluding meat)	63
Fish	31
Bush Meat	32
Medicinal Plants	60
Construction materials	42
Mushrooms	5
Snails, termites	3

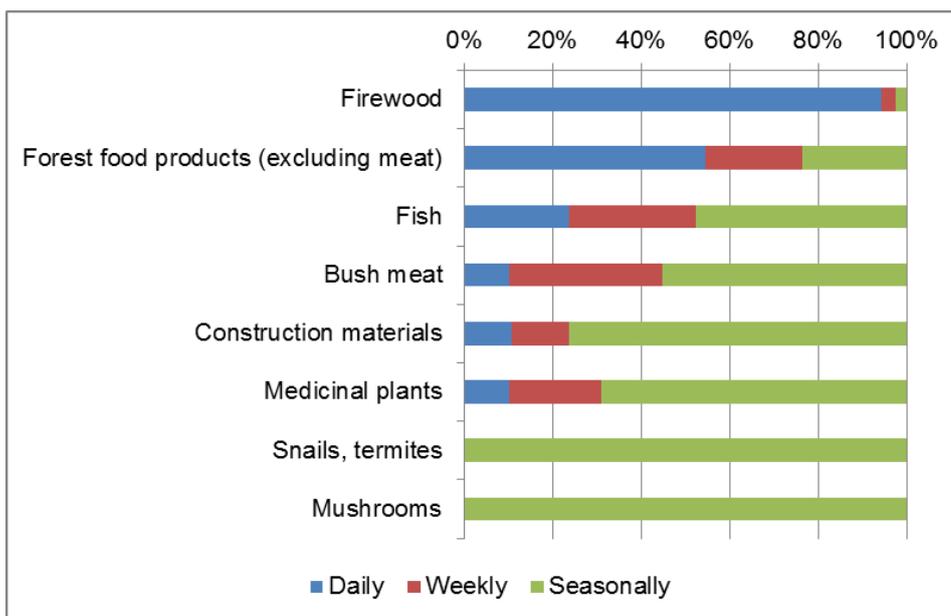


Figure 2-4: Frequency with which natural resources are harvested.

3 HCV Assessment Team

Name	ALS license	Institution	Role	Expertise	Bio
Leigh-Ann de Wet	(RSPO accredited HCV assessor)	LD Biodiversity Consulting	Team Leader	HCV general, botanist	Leigh-Ann de Wet, holds an MSc in Botany at Rhodes University, is registered with the Round Table on Sustainable Palm Oil as a High Conservation Value Forest Assessor. Experience includes ecological impact assessments, baseline vegetation assessments, monitoring plans, Biodiversity Action Plans and rehabilitation plans in the renewable energy, mining and palm oil sectors, amongst others. Project experience includes various countries such Mozambique, Malawi, Zambia, Madagascar and Liberia and throughout South Africa.
Phil Patton	N/A	Digby Wells environmental	Terrestrial Fauna	Zoologist	Phil Patton is the Manager of the Biophysical Department at Digby Wells. He holds a B.Sc Hons (Environmental and Geographical Science) from the University of Cape Town, and a B.Sc (Geology and Geography & Environmental Management) from the University of Port Elizabeth. He is an experienced ornithologist, and has been registered as a Professional Natural Scientist since 2012. Phil has over 17 years of consulting experience in ecological assessments and environmental auditing within the mining, and other similar industries. He has ecological and environmental working experience across Africa, Europe and the Middle East.
Russell Tate	N/A	Digby wells Environmental	Aquatic ecology	Aquatic scientist	Russell Tate holds a Master's degree in aquatic health from the University of Johannesburg (South Africa). Russell has completed aquatic assessments in several African countries including: Botswana, Democratic Republic of Congo (DRC), Mali, Senegal, Ivory Coast, South Africa, and Mozambique with focused tropical assessments in Cameroon, Liberia and Ghana.
Caitlin O'Conner	N/A	Digby Wells Environmental	Terrestrial fauna and flora		Caitlin O'Connor has a Masters in Landscape Architecture from University of Cape Town (UCT). She has worked for Digby Wells for a number of years undertaking, ecological impact assessments, biodiversity studies, rehabilitation plans, and environmental plans. She has undertaken projects in various sectors, including minerals, energy (both renewable and non-renewable) and agriculture.

4 Methods

A number of specialist assessments were conducted and used to inform this HCV assessment. These included:

- A social assessment conducted in order to establish the baseline social conditions at the site;
- A vegetation assessment, aimed at identifying the main habitat types of the Yaligimba study area;
- A herpetofauna assessment, which was conducted to determine a herpetofauna baseline for Yaligimba;
- A mammal and avifauna assessment, which was conducted to determine a mammal and avifauna baseline for Yaligimba and;
- An aquatic ecological assessment, which formed a baseline for the aquatic conditions of the site.

Information from these assessments from desktop data collection and analyses to field data was collated to form this HCV report. Table 4.1 below shows the important dates of each of these studies.

Table 4.1: Timeline for the studies used for this HCV assessment

Assessment	Pre-assessment and desktop data collation	Field work	Data analysis and report compilation
Social Assessment	December 2014 – January 2015	11 – 22 January 2015	February – May 2015
Vegetation	December 2014 – January 2015	24 – 29 January 2015	February – May 2015
Herpetofauna	December 2014 – January 2015	24 – 29 January 2015	February – May 2015
Mammal and Avifauna	December 2014 – January 2015	24 – 29 January 2015	February – May 2015
Aquatics	December 2014 – January 2015	24 – 29 January 2015	February – May 2015

A summary of the methodology for each of these studies is presented in Sections 4.2 to 4.6. Detailed methodologies are presented in each specialist report.

4.1 Desktop analyses

Each specialist study team carried out a desktop review of reports, documents and plans to begin to establish a baseline for the Yaligimba area of influence and the surrounding region; the review included HCV assessment key documents. Some of the reports included:

- *Internal Company documents*, including those pertaining to Environmental, Social and Governance (ESG) strategies and monitoring reports, minutes of Board meetings, policies and procedures, quarterly reports, and other reports detailing relevant project information;
- The *Social and Environmental Impact Assessment*, and *Environmental and Social Assessment: Scoping Study* conducted by the Feddersen Consulting group, dated May and August 2014, respectively;
- The *Environmental and Social Action Plan (ESAP)* for the plantations, compiled by Feronia PHC;
- A *Social and Environmental Review: Phase 2 Report*, compiled by Intersocial in January 2015;
- Available *aerial and satellite imagery* of the study area, spatial data of the best estimates of the extent of the concession areas, and other hand drawn maps of the layout of the concession areas.
- Species lists were obtained using the following resources:
 - WWF, the International Union for Conservation of Nature (IUCN), and African Bird Club online species distribution maps were used to obtain data for the distribution of flora, mammals and birds within the greater study area, it is noted that this was severely limited for this part of the Congo Basin;
 - The potential occurrence of mammals was supplemented by the species distribution maps in *Field Guide to African Mammals*, Jonathan Kingdon (2007), and;
 - Lists of birds found in the study area were determined using a number of field guide publications including *Birds of Western and Central Africa* (Van Perlo, 2002), and *Birds of Africa South of the Sahara* (Sinclair and Ryan, 2003).
- Common Guidance for HCV Identification and Common Guidance for HCV management and Monitoring;
- HCV Assessment Manual; and
- HCV assessment report template.

4.2 Social survey

The social team carried out:

- 10 number of focus group discussions (FGD); a method of qualitative data collection methodology involving small-group meetings led by a facilitator and guided by a semi-structured interview schedule;
- 7 one-on-one interviews with members of local communities, from camps, villages outside the concession, chiefs, government representatives, worker union representatives and plantation management staff (Table 4-2).

Table 4.2: interviews conducted at the Yaligimba study site.

Interviewee	Date
APEI agricultural NGO	3 February 2015
Chiefdom and sector chiefs	5 February 2015
Union representatives	5 February 2015
UNIPM community palm oil plantation - NGO	5 February 2015
Nuns at Saint Joseph's parish	6 February 2015
Feronia PHC hospital doctor and nurses	6 February 2015
Feronia PHC plantation management	6 February 2015

The sampling methodology was largely dictated by the nature of the study areas and the available resources, including vehicles. Worker camps inside the concession areas were prioritised, followed by non-worker communities inside the concession areas, and lastly villages outside the concession areas. Convenience sampling was thus employed to meet the predefined targets at each of the plantations (300 surveys at Yaligimba). Based on estimates of the total population, 9% of the total population in the study area were surveyed.

A community survey was implemented in all the settlements inside the study areas. This survey focuses on all assets, structures, etc. that are **not** the property of individual households, and includes wells/ water pumps, soccer fields, schools, clinics, communal cemeteries, etc. The GPS locations of all such assets were recorded, and basic information (uses of structures) is captured in a questionnaire. Photographic records were also kept of each surveyed structure.

4.3 Vegetation survey

The vegetation assessment was conducted over 5 days (the 24th to the 29th of January 2015). As such, the most efficient ways of describing the vegetation at a general level were employed. A sampling strategy called stratified random sampling was used.

Stratified random sampling is often used in forestry to ensure the collection of data that best describes the forest. The way in which this is done is that the area to be surveyed is divided up into non-overlapping strata (Czaplewski *et al.* 2004). For the Yaligimba area of influence, this was done using available satellite imagery. The area was divided up into clear zones, which corresponded to this imagery. The zones included forest, secondary forest and plantation, for example. Each of these was then be sampled separately to gain an understanding of the composition of these different types. If, in the field, more zones such as different forest types were seen, then these were divided up further.

Sampling strategy allowed for the sample plots and transects to be located in each of the different vegetation and forest types present in the study area. For the actual sample technique, a modified Rapid Botanical Survey (RBS) technique was employed. RBS is usually used to study plant communities and describe vegetation (Hawthorne 2012). RBS allows for the elucidation of several aspects of vegetation including:

- Plant distribution, including that of Species of Special Concern (SSC) and invasive species;
- Trends in variation of vegetation including variation following on from environmental variables; and
- Conservation priority of vegetation (Hawthorne 2012)

For the purposes of this study, where even a standard RBS plot can take up to 5 hours, the methodology was shortened. Each plot or transect was surveyed for the most dominant plant species, as well as SSC and invasive species. Any plant species bearing fruit or flowers was also identified to obtain a more complete list of the vegetation. This allowed for the classification of vegetation on a very general level. The result is a broad-scale classification of the vegetation types based on abiotic features and the definitions of secondary and primary forest. This is sufficient for mapping and general vegetation descriptions.

4.4 Mammal and Avifaunal survey

The field survey included vantage point surveys, dawn, dusk and night surveys and transect surveys throughout the concession. Activities undertaken and data collected during the surveys included:

- Identification of key species and species of special concern (SSC);
- Undertaking of density surveys for certain key species;
- Study of bird movements at various vantage points within the riparian system;
- Determination of behavioural aspects of key species especially those that would be impacted by the project (e.g. breeding).

Diurnal Point Surveys were also carried out to estimate spatial and temporal use of the site by resident and migrant raptors, and other diurnal passerines. Sampling intensity also assisted to document the movement of the more visible species such as raptors, parrots and hornbills throughout the concession area.

Sightings and ecological indications were used to identify the mammal inhabitants of the study area; this includes scats, tracks and habitat such as burrows and dens. Where found, scats were collected and photographed (with a scale). Any tracks observed were used to identify mammals. Field guides were used to confirm identification. The following were recorded:

- All mammals encountered, noted or captured during the survey;
- Animals listed in previous studies;
- A list of the most prominent mammal species; and
- A list of threatened or protected species encountered during the survey.

The principle ornithological field survey technique was transect surveys. Transect surveys were planned based on the different types of avifauna habitat, such as closed forest (thick canopy, where the sky may not be visible), and open secondary forest. Transect procedures involve slow attentive walks along transects during which any bird seen or heard is identified and recorded. Point sampling was also conducted for a period of 1 hour at several localities throughout the site when opportunities arose. Bird species observed during the vegetation transect surveys were also recorded.

The following were recorded:

- All birds encountered or noted during the survey;
- A list of species that had new or extended range distribution; and
- A list of rare and endangered species encountered.

4.4.1 Herpetological survey

- Amphibians were sampled during the early morning and late night;
- Amphibians were sampled for each habitat type by actively searching in foliage, around tree roots, at water's edge and under leaves in order to determine if each supports a different species suite;
- Reptiles were sampled primarily whilst carrying out transect walks and active searches during the day, in each habitat type; and
- Reptiles and amphibians that are important to the community were recorded using a geographic positioning system (GPS).

4.4.2 Aquatic Ecological survey

The Aquatic ecology assessment included water quality, as well as a study on fish species present and macro invertebrates. Various indices and systems were used: these are described below.

Water quality results were measured using a calibrated Extech DO 700 multimeter. Constituents considered in this study included: temperature (°C), pH, dissolved oxygen (mg/l) and conductivity (µS/cm).

Due to the reliance and adaptations of aquatic biota to specific habitats, the availability and diversity of habitat is important to consider for aquatic assessments (Barbour et al., 1996). Habitat quality and availability assessments are therefore usually conducted alongside biological assessments involving fish and macroinvertebrates. Aquatic habitat (habitat) was assessed through the general description of each river system considered, utilising various methods set out by Bain and Stevenson, 1990, Vannote *et al.*, 1980 as well as Gerber and Gabriel, 2002. In addition, a general habitat integrity assessment was carried out as set out below.

The assessment and description of habitat would be used in this study to ascertain the potential presence of HCV/Rare, Threatened and Endangered (RTE) taxa. Furthermore, in order to determine the conservation value of the considered river systems, the assessment for the potential of “natural conditions” should be completed (Brown *et al.*, 2013).

In order to define a general habitat, for baseline purposes, the general instream and riparian habitat was assessed and characterised according to section D of the “Procedure for Rapid Determination of Resource Directed Measures for River Ecosystems, 1999”. The Intermediate Habitat Integrity Assessment (IHIA) model was used to assess the integrity of the habitats from a riparian and in-stream perspective. The habitat integrity of a river refers to the maintenance of a balanced composition of physico-chemical and habitat characteristics on a temporal and spatial scale that are comparable to the characteristics of natural habitats of the region (Kleyhans, 1996).

The Integrated Habitat Assessment System (IHAS) was specifically designed to be used in conjunction with benthic macroinvertebrate assessments and will be used for the proposed study. However, the IHAS has recently been shown to produce unreliable scores in regard to habitat suitability often producing varying results between geomorphological zones and biotype groups. Due to this limitation the results of the IHAS assessment should be taken into consideration with caution. The IHAS assesses the availability of the habitat biotopes at each site and expresses the availability and suitability of habitat for macroinvertebrates, this is determined as a percentage, where 100% represents "ideal" habitat availability.

Aquatic macroinvertebrate assemblages are good indicators of localised conditions because many benthic macroinvertebrates have sedentary characteristics with relatively long lives (± 1 year) (USEPA, 2006). Macroinvertebrates are useful for their ability to integrate pollution effects over time, their detectable response to environmental impacts as well as the easy field sampling techniques involved in their collection. Benthic macroinvertebrate assemblages are made up of species that constitute a broad range of trophic levels and pollution tolerances, thus providing strong information for interpreting cumulative effects (USEPA, 2006). The assessment and monitoring of benthic macroinvertebrate communities forms an integral part of the monitoring of the health of an aquatic ecosystem (Hellowell, 1977).

The Namibian Scoring System 2 (NASS2) (Palmer and Taylor, 2010) invertebrate index is designed for the use in tropical locations in Africa and therefore has been considered to be more appropriate for use in this study (when compared to SASS5 (Dickens and Graham, 2002)). Sample collection was completed according to the SASS5 methodology (Dickens and Graham, 2002) which included the timed sampling of three separate biotopes: Stones, bedrock (in- and out-of-current), vegetation (in- and out-of-current) and Gravel, Sand and Mud (GSM) utilising a 1mm mesh net of a standard area (45cm X 45cm). Identification of macroinvertebrate taxa was carried out to family level with a log abundance category estimated for all taxa identified in the sample (1-9, 10-99, 100-999 and 1000+ individuals present).

4.5 HCV Assessment

This HCV assessment is based on two documents; the first is the general guidance of HCV assessment (Brown *et al.* 2013) and the second, the country-level guidance for HCV assessment (The Pro-forest initiative, 2012). Each of these was reviewed, and the criteria for the interpretation of the 6 HCVs identified. The criteria for the 6 HCVs were then added to a matrix, which was used for determining the presence or absence of each of the HCVs based on both desktop and field data. The matrix is designed for presence/absence data, which is all that is required for HCV determination. There is also a specific list of definitions for aquatic systems, which are in Annex 3 of Brown *et al.* (2013), derived from Abell *et al.* (2013) and these are used specifically for the freshwater component of the assessment.

The Precautionary Approach is an essential part of HCV determination (Brown *et al.* 2013, Paulina Villaipando HCVRN secretariat, pers. comm.). Brown describes the Precautionary Approach in the context of HCV: “The Precautionary Approach means that when there are reasonable indications that an HCV is present, the assessor should assume that it is present.” Brown goes on to recommend that where there is doubt in whether or not an HCV is present, additional studies may be required to determine that it is unequivocally not present. Also stated in the country HCV guidance document (The Proforest Initiative, 2012) is that due to the poor knowledge of the RTE taxa of the DRC, the precautionary approach should be used in HCV assessments.

Interpretation of the HCV values is important. Most of the HCVs require the criteria to be significant. Brown *et al.* (2013) describe significance: “In practical terms, significant values are those recognized as being either unique, or outstanding relative to other examples in the same region, because of their size, number, frequency, quality, density or socio-economic importance, on the basis of existing priority frameworks, data or maps, or through field studies and consultations undertaken during the HCV assessment.” Such significance may include IUCN red list, Key Biodiversity Areas, and other areas defined by an international organization. National authorities or NGOs may also define significant values. Field studies may also determine significant values. For HCV 1, 2 and 3, the scale at which significance is required is national, regional or even global. However, HCV 4, 5 and 6 are irrelevant to scale: they are irreplaceable to the community that relies on them (Brown *et al.*

2013). The thresholds and significance values used for this HCV assessment are based on the guidance documents including the general guidance and country documents (Brown *et al.* 2013 and The Proforest initiative, 2012) as well as communication with Paulina Villaipando of the HCVRN secretariat.

4.6 Threat assessment

Threat assessment methodology was based on the IUCN Threat Impacts Classification Scheme (Version 3.2) (<http://www.iucnredlist.org/technical-documents/classification-schemes/threats-classification-scheme>). A list of threats (Table 4.3) was reviewed and then analysed for each HCV in the study area. The threat was scored based on the timing, scope and severity. Adapted options for these categorisations are provided below:

Timing

- Only in the past and unlikely to return
- In the past but now suspended and likely to return
- Ongoing
- Only in the future
- Unknown

Scope

- Affects the whole HCV (>90%)
- Affects the majority of the HCV (50 – 90%)
- Affects the minority of the HCV (<50%)
- Unknown

Severity

- Causing or likely to cause very rapid loss of the HCV (>30% over 10 years)
- Causing or likely to cause rapid loss of the HCV (20 – 30% over 10 years)
- Causing or likely to cause relatively slow but significant loss of the HCV (<20% over 10 years)
- Causing or likely to cause fluctuations
- Causing or likely to cause negligible loss of the HCV
- No loss
- Unknown

A score can be calculated based on the options above; the scoring table used is that of the IUCN (Table 4.3).

Table 4.3: Threats listed in the IUCN documents and considered relevant to the HCVs in the Feronia Yaligimba concession.

Category	Type of threat	Specific threat
Agriculture	Annual and perennial non-timber crops	Shifting agriculture
		Agro-industry farming
Transportation and service corridors	Roads	
Biological resource use	Hunting and collecting terrestrial animals	Intentional use
	Gathering terrestrial plants	Intentional use
	Logging and wood harvesting	Intentional use: subsistence/ small scale
	Fishing and harvesting aquatic resources	Intentional use: subsistence/ small scale
Natural system modification	Dams and water management	Abstraction of surface water (domestic use)
		Abstraction of surface water (commercial use)
		Abstraction of ground water (domestic use)
Invasive and other problematic species, genes or diseases	Invasive non-native/ alien species	Named species
	Problematic native species	Named species
Pollution	Domestic waste water	Sewage
		Run-off
	Industrial effluents	Mill effluent
	Agricultural effluents	Nutrient loads
		Soil erosion, sedimentation
	Herbicides and pesticides	

Table 4.4: Scoring system for threats to HCVs (from IUCN Threat Impacts Classification Scheme)

		a) Continuing threat				b) Threat may occur/ return in the short term				c) Threat may occur/ return in the long term					
Scope	Severity	Very rapid	Rapid	Slow	Negligible	Very rapid	Rapid	Slow	Negligible	Very rapid	Rapid	Slow	Negligible		
		Score				Score				Score					
		3	2	1	0	3	2	1	0	3	2	1	0		
Whole	3	6	5	4	3	3	6	5	4	3	3	6	5	4	3
Majority	2	5	4	3	2	2	5	4	3	2	2	5	4	3	2
minority	1	4	3	2	1	1	4	3	2	1	1	4	3	2	1
Negligible	0	3	2	1	0	0	3	2	1	0	0	3	2	1	0

Impact coding:

	High impact
	Medium impact
	Low impact
	Negligible/ low impact

5 Findings of the HCV Assessment

Each of the HCV matrices presented in sections 5.1 to 5.5 show the definition of the HCV, followed by a table and the criteria for each HCV, adjacent the criteria are the threshold given for each of the criteria. It is the threshold that is used to determine the presence or absence of the HCV. Only one of these thresholds needs to be triggered for the specific HCV to be present within the area of influence. Reasons are provided in the last column if the HCV is found to be present for that particular criterion and threshold. The columns present, absent and PA used are filled when the threshold is clearly present (just the present column filled), absent (just the absent column filled) or assumed to be present using the Precautionary Approach (PA) (both present and PA used columns filled) as required by HCV Assessment best practice (Brown et al. 2013, The Proforest Initiative 2012). This allows a clear indication of the presence or absence of each criterion (with associated thresholds) and where the Precautionary Approach is used. Table 5.1 provides a brief summary of the findings of the HCV assessment.

Table 5.1: Summary table of presence and absence of HCVs

HCV	Definition	Present	Absent
HCV 1: Species diversity	Concentrations of biodiversity including endemic species, and rare, threatened or endangered species (RTE), that are significant at global, regional or national levels.		
HCV 2: Landscape-level ecosystems and mosaics	Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.		
HCV 3: Ecosystems and habitats	Rare, threatened, or endangered ecosystems (RTE), habitats or refugia.		
HCV 4: Ecosystem services	Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.		
HCV 5: Community needs	Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.		

HCV	Definition	Present	Absent
HCV 6: Cultural values	Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local peoples, identified through engagement with these local communities or indigenous peoples.		

5.1 HCV 1: Species diversity

HCV 1 is assessed here based on criteria and thresholds developed by Brown *et al.* (2013), The Proforest Initiative (2012), Abell *et al.* (2013), and Paulina Villaipando, pers. comm. (9 June 2015). Each of the criteria, with references is shown in Table 5.2. The evidence used to determine the reasons for the HCV presence is then given below the table.

Table 5.2: HCV 1 matrix

Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels.					
Criteria	Threshold	Present	Absent	PA used	Reasons
Significant concentrations of biodiversity, recognized as unique or outstanding in comparison with other areas (within the same country or region). ¹	Limited knowledge of the DRC and surrounding areas does not allow for direct comparison.				The area is heavily disturbed due to past commercial and subsistence logging, as well as subsistence farming by the local population.
Significant concentrations of biodiversity, recognized as unique or outstanding on the basis of priority frameworks or field assessments. ^{1,3}	Where any Critically Endangered species are recorded, or their habitat is present if they are not recorded. ^{4,2}				No CR species were recorded, and no habitat is present.
	Presence of Okapi, Great Apes (gorilla, chimpanzee and bonobo), elephant and the congo peafowl. ²				No such species were recorded, and no habitat is present.

Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels.					
Criteria	Threshold	Present	Absent	PA used	Reasons
	Where there is the presence of four or more EN, VU or endemic species. ^{4, 2}				Two RTE taxa are recorded from the area of influence and include the plant <i>Pericopsis elata</i> (EN) and the African Grey Parrot (<i>Psittacus erithacus</i>) (VU). No endemic taxa were recorded. Two avifauna taxa were recorded as range extensions.
	A species on the IUCN red data list (EN or VU) recorded in large populations and therefore forming an important concentration on a regional scale. ¹				Although the African Grey Parrot (<i>Psittacus erithacus</i>) (VU) was found in relatively large numbers in the area of influence, these populations are not considered significant at the regional scale.
	There is a strong presence of endemism – even if the list of species is incomplete or not well known.				No endemic species were recorded.
Protected areas, Alliance for Zero Extinction sites, Ramsar sites and others, including CARPE landscapes. ^{1, 3, 2}	Protected areas are used as a proxy for HCV, and where information is limited the Precautionary Approach states that all protected areas are HCV 1. ¹				No such landscapes coincide with the area of influence.

Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels.					
Criteria	Threshold	Present	Absent	PA used	Reasons
Areas of critical temporal use, including flow or thermal refugia, spawning/breeding, nursery, migratory, feeding or over-wintering areas. ³	Migratory or critical dispersal routes for fish, wetland birds, aquatic-dependent mammals/amphibians/reptiles, or aquatic invertebrates (e.g. floodplains, deep or vernal pools, river channel corridors). ³				No migratory or critical dispersal routes were recorded in the area of influence.
Surfaces covered by Ancient forest with a high number of indicator species. ²	No threshold is given for the indicator species, or a definition for Ancient forest therefore primary forest with little disturbance is considered the threshold.				Natural forest is restricted in distribution and does not form viable habitat within the area of influence.
Remarkable ecosystems. ²	Unique habitat for certain species (<i>Juniperus procera</i>) or an endangered habitat (the presence of <i>Encephalartos ituriensis</i> , <i>Diospyros grex</i> , <i>Diospyros wagemansii</i>). ²				
Zones of seasonal species ²	Presence of migratory birds ²				Some migrants were recorded, but not enough to be significant at a regional or national scale.
	Nesting areas for significant numbers of birds or bats (trees, lakes, caves etc.) ²				None discovered.
	Bays and lagoons, fresh or salt water that might be a focus for visiting mammals. ²				None recorded.
	Forests, wetlands, rivers that are being used as a temporary resource for large populations of birds that are protected or threatened and spawning				None recorded.

Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels.					
Criteria	Threshold	Present	Absent	PA used	Reasons
	areas of fish species. ²				
	Concentrations of fruiting trees (those that are particularly important for seasonal subsistence for frugivores, notably primates). ²				No concentrations of trees present.

References for the table are given as ¹ Brown *et al.* (2013), ² The Proforest Initiative (2012), ³ Abell *et al.* (2013), ⁴ Paulina Villaipando, pers. comm. (9 June 2015).

In considering the presence of HCV 1 within the area of influence, and, more limited in distribution within the concession, endemic and RTE taxa must be taken into account. In the DRC, many of the indigenous taxa have not been assessed by the IUCN for their redlist status and many of the taxa in the region are unknown (The Proforest Initiative 2012). Due to the paucity of knowledge of endemic and redlist taxa in the region and country, the precautionary approach must be used to determine their presence (Browen et al 2013, The Proforest Initiative 2012 and Paulina Villaipando pers.comm.). Likelihood of occurrence of such taxa is thus important. A search of the IUCN red list for the DRC shows that there are 870 species are listed as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Data Deficient.

The avifauna assessment recorded new range extensions for two species (Table 5.3) that have not previously been recorded from the Yaligimba region. Both species are relatively common throughout their more generalized range in Africa. Identification of two RTE species has been made. These are listed in Table 5.4. A note was made that a sub-species of kingfisher was recorded at Yaligimba that may be new (different colours and call). This may prove to be a new sub-species, however, the habitat in which it is present is not restricted to the Yaligimba study area.

Table 5.3: Bird species with distribution range extensions recorded from Yaligimba

Common name	Scientific name
African rail	<i>Rallus caerulescens</i>
Little egret	<i>Egretta garzetta</i>

Table 5.4: RTE taxa from the Feronia Yaligimba study site

Common name or group	Scientific name	IUCN status or Endemicity
African Grey Parrot	<i>Psittacus erithacus</i>	Vulnerable according to the IUCN
Afromisia (Plant)	<i>Pericopsis elata</i>	Endangered according to the IUCN

Based on the information available from the baseline studies of flora, fauna and aquatics and the other desktop data available for the area, HCV 1 is absent in the area of influence. This is based primarily on the following key findings:

- The absence of undisturbed vegetation within the study area;
- The potential presence, and presence of a very low number of RTE species;
- The accessibility of surrounding areas, which are heavily disturbed by the local people and past commercial logging activities.

5.2 HCV 2: Landscape-level ecosystems and mosaics

HCV 2 is assessed here based on criteria and thresholds developed by Brown *et al.* (2013), The Proforest Initiative (2012), Abell *et al.* (2013), and Paulina Villaipando, pers. comm. (9 June 2015). Each of the criteria, with references is shown in Table 5.5. The evidence used to determine the reasons for the HCV presence is then given below the table.

Table 5.5: HCV 2 matrix.

Large landscape-level ecosystems and mosaics, that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.					
Criteria	Threshold	Present	Absent	PA used	Reasons
Large, landscape-level ecosystems and ecosystem mosaics. ¹	Area needed to maintain viable populations. An area of 50,000ha is a guideline. ¹				Absent, the area is fragmented with very little natural forest.
Viable populations of the great majority of species. ^{1,2}	Landscapes not affected by clearance, heavy logging, damming of waterways, dominance of domestic or alien species or other anthropogenic disturbance for several decades. The area does not have to be pristine, some species may be extirpated, especially vulnerable hunted species. ^{1,2}				The area has been impacted by anthropogenic disturbance.
Freshwaters with intact hydropatterns. ³	Rivers with natural flow regimes ³				The area of influence does not contain large rivers, and rivers present are encumbered by anthropogenic activities.
	Lakes and wetlands with natural hydropatterns ³				No lakes or extensive wetlands are present within the area of influence.

Large landscape-level ecosystems and mosaics, that are significant at global, regional or national levels, and that contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.					
Criteria	Threshold	Present	Absent	PA used	Reasons
Freshwaters with unfragmented longitudinal connectivity ³	Rivers without upstream/ downstream barriers preventing species from completing life cycles ³				These are present within the overall riparian systems.
Freshwaters with unfragmented lateral connectivity ³	Unmodified river channels with dynamic connection to floodplain ³				Not present.
Freshwaters with natural water quality conditions ³	Unmodified thermal, sediment, and nutrient regimes ³				Land cover conversions and presence of solid waste and other anthropogenic influences on the freshwater systems indicate these are absent.
Relatively intact watersheds/ catchments ³	Land cover conversion below threshold of concern ³				
Freshwaters with intact native communities ³	Lakes, rivers, and wetlands without invasive species ³				Invasive taxa were recorded. .
Falls within an important landscape ²	CARPE landscapes, Intact Forest Landscapes (IFL), Ramsar sites, other internationally designated area ²				None.

References for the table are given as ¹ Brown *et al.* (2013), ² The Proforest Initiative (2012), ³ Abell *et al.* (2013), ⁴ Paulina Villaipando, pers. comm. (9 June 2015).

The primary considerations for establishing the presence of HCV 2 are the presence of important internationally recognized landscapes within the area of influence. As IFLs are not present, HCV 2 is also not present.

Based on the information available from the baseline studies of flora, fauna and aquatics and the other desktop data available for the area, HCV 2 is absent within the area of influence. The plantations themselves do not constitute HCV 2, nor do the secondary forests and disturbed areas of the concession. This is based primarily on the following key findings:

- The absence of undisturbed primary forest in the region;
- The evidence of heavy logging in the area and resulting high levels of disturbance.

5.3 HCV 3: Ecosystems and habitats

HCV 3 is assessed here based on criteria and thresholds developed by Brown *et al.* (2013), The Proforest Initiative (2012), Abell *et al.* (2013), and Paulina Villaipando, pers. comm. (9 June 2015). Each of the criteria, with references is shown in Table 5.6. The evidence used to determine the reasons for the HCV presence is then given below the table.

Table 5.6: HCV 3 matrix

Rare, threatened, or endangered ecosystems, habitats or refugia					
Criteria	Threshold	Present	Absent	PA used	Reasons
Rare, threatened or endangered freshwater ecosystems ³	e.g. karstic systems, peatlands ³				These ecosystems were not recorded during the Digby Wells field study, nor identified from satellite imagery.
Rare ecosystems. ¹	Naturally rare: ecosystems with a combinations of unusual factors which are both biotic and abiotic ²				
	Become rare: ecosystems which have been reduced by human action ²				
Threatened or endangered ecosystems ²	Ecosystems of which the area is very reduced or fragmented, or which are isolated by human action ²				
	A restrained distribution: unique ecosystem which are little represented in the landscape ²				
	Badly represented in conservation:				

Rare, threatened, or endangered ecosystems, habitats or refugia					
Criteria	Threshold	Present	Absent	PA used	Reasons
	ecosystems which are little or badly represented in reserves and parks ²				
	Badly protected: ecosystems which are protected areas but badly protected in reality ²				
Habitats ¹	Rocky outcrops ¹				No rocky outcrops were identified within the Yaligimba area of influence.
	Seasonal wetlands ¹				Seasonal wetlands are not present.
Refugia ¹	Ecological refugia: isolated areas which are sheltered from current changes				These refugia were not recorded during the Digby Wells field study, nor identified from satellite imagery.
	Evolutionary refugia: areas where certain types or suites of organisms persisted during a period when climatic events reduced habitable areas elsewhere.				
Specific ecosystems within the DRC ²	Mountain forests ²				Mountains are not present within the area of influence.
	Mangroves ²				Mangroves do not occur in the general region
	Sclerophyllous forests ²				Sclerophyllous forests were not identified in the Digby Wells site visit, and the vegetation survey established the forest is moist tropical rainforest.
	Inselbergs ²				Inselbergs do not occur within the area of influence as is clear from satellite imagery.
	Bays, salt pans and forest enclaves ²				These ecosystems were not recorded during the Digby Wells field study, nor identified from satellite imagery.

Rare, threatened, or endangered ecosystems, habitats or refugia					
Criteria	Threshold	Present	Absent	PA used	Reasons
	Ancient forests; myrtaceae, oleaceae, cesalpiniaceae ²				No Myrtaceae or Oleaceae were found during the vegetation assessment. One species in the Cesalpiniaceae was recorded: <i>Gilbertiodendron dewevrei</i> which on its own does not comprise ancient forest as defined in this threshold.
	Dry forests, xeric coastal forests ²				These do not occur within the area of influence as the vegetation assessment has classified the vegetation as moist tropical rainforest.
	Forests which have a single dominance which is unique or unusual (NB forests of <i>Gilbertiodendron</i> is not as rare or threatened in the DRC) ²				There are no indications that these forests are present within the area of influence as none were found during the Digby wells field assessment.

References for the table are given as ¹ Brown *et al.* (2013), ² The Proforest Initiative (2012), ³ Abell *et al.* (2013), ⁴ Paulina Villaipando, pers. comm. (9 June 2015).

Overall, the vegetation was found to show little variation, with the majority of the study area under heavily disturbed forest (riparian, swamp or dryland). Plantations and agriculture fragment the landscape, commercial and subsistence logging has also taken place, resulting in a high level of disturbance overall. Niche flora species were not recorded. Niche avifaunal species were also not recorded, indicating no specific niche habitats within the study area. This was also evident from the mammal survey. There are no niche habitats present within the river systems and no indicator species of such niches were found.

Based on the information available from the baseline studies of flora, fauna and aquatics and the other desktop data available for the area, HCV 3 is absent from the study area. The plantations themselves do not constitute HCV 3, nor do the secondary forests and disturbed areas of the concession. This is based primarily on the following key findings:

- No identified areas of geomorphological concern such as mountains, cliffs, waterfalls and other potential refugia.
- The lack of niche species identified in each of the assessments indicates that no niche habitats are found within the study area.

5.4 HCV 4: Ecosystem services

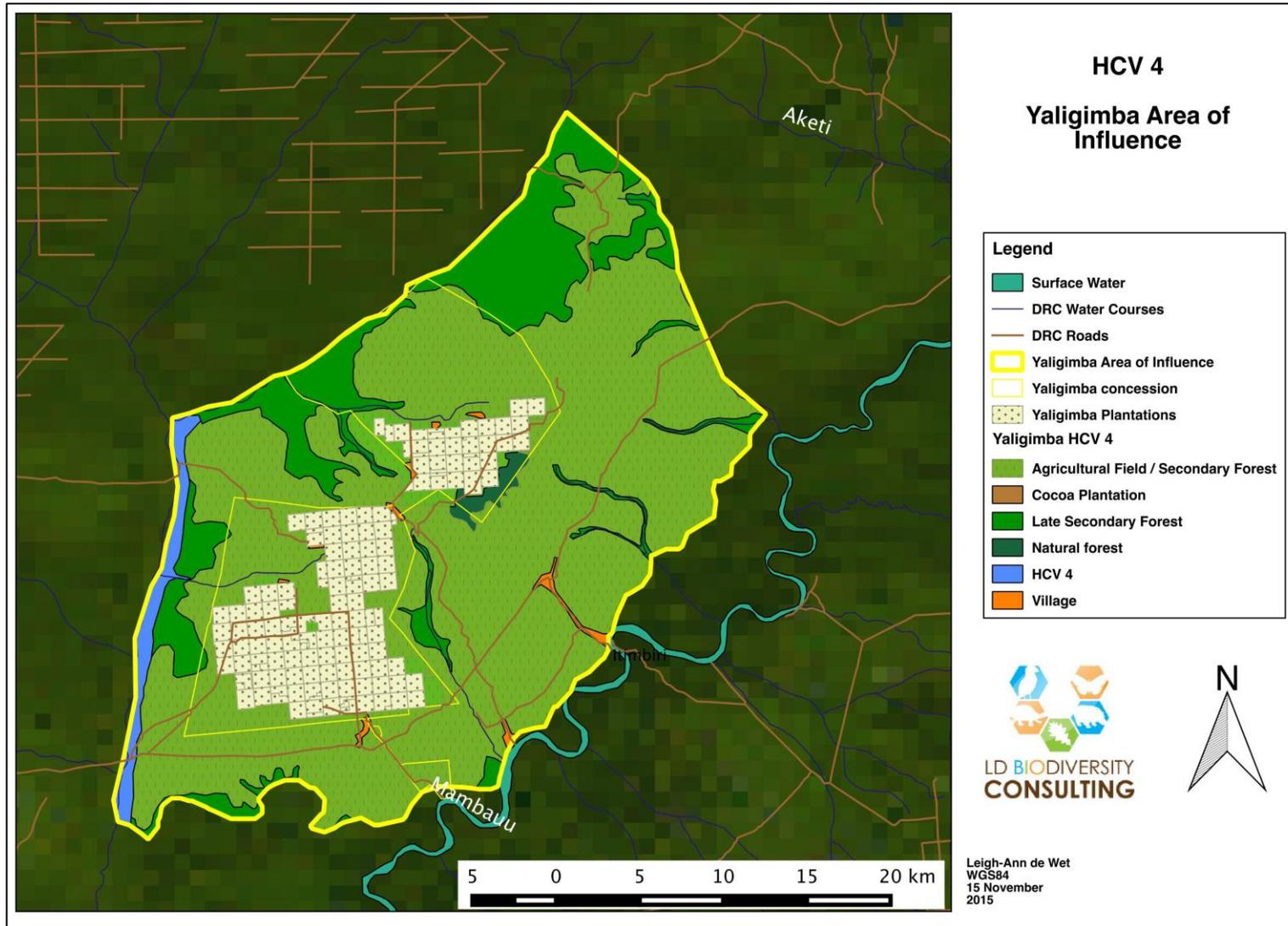
HCV 4 is assessed here based on criteria and thresholds developed by Brown *et al.* (2013), The Proforest Initiative (2012), Abell *et al.* (2013), and Paulina Villaipando, pers. comm. (9 June 2015). Each of the criteria, with references is shown in Table 5.7. The evidence used to determine the reasons for the HCV presence is then given below the table. The HCV is mapped (Map 5-1), where it occurs within the Yaligimba area of influence and in relation to the concession.

Table 5.7: HCV 4 matrix

Basic ecosystem services in critical situations including protection of water catchments and control of erosion of vulnerable soils and slopes					
Criteria	Threshold	Present	Absent	PA used	Reasons
Ecosystem services, in critical situations related to ¹	Vegetated riparian buffer zones or intact floodplains ^{1,3}				A large floodplain wetland is present on the western edge of the area of influence, but does not occur within the concession.
	Maintaining downstream flow regimes ^{1,3}				These such systems are not present within the area of influence.
	Maintaining water quality characteristics ¹				
	Providing protection to vulnerable soils, aquifers and fisheries ¹				
	Provision of clean water where local communities depend on natural rivers for drinking water ^{1,2,3}				
Protection against wind and regulate humidity, rainfall and other climatic elements ¹					
Including specific areas ¹	Forests, wetlands and other ecosystems which				Although such areas of natural

Basic ecosystem services in critical situations including protection of water catchments and control of erosion of vulnerable soils and slopes					
Criteria	Threshold	Present	Absent	PA used	Reasons
	provide a protective barrier against destructive fires that could threaten communities, infrastructure or other HCVs ¹				forest are present, and could act as fire barriers, it is important to note that fires in moist tropical forests are rare. ²
	Groundwater recharge zones ^{1, 3}				These are present in areas outside the area of influence.
Watershed/catchment areas critical to managing/maintaining extreme flow events (e.g. flooding, drought) ³	Floodplains and other wetlands ³				Wetlands in the form of swamp forests and a large floodplain swamp are found on the western edge of the area of influence.
	Springs ³				No springs were recorded or reported from the area of influence during the Digby Wells study.
Forests providing protection of hydrological systems ²	Forests absorbing the effects of drought, protecting against floods and maintaining water flow ²				No such forests are present within the area of influence.
Protection against erosion ²	Forests near steep slopes and mountains that protect against erosion that may affect roads and transport networks, hydrological infrastructure, agriculture, cultural sites, human settlements, rare or fragile ecosystems and fragile soils. ²				The area is generally flat, with no steep slopes or mountain ranges.

References for the table are given as ¹ Brown *et al.* (2013), ² The Proforest Initiative (2012), ³ Abell *et al.* (2013), ⁴ Paulina Villaipando, pers. comm. (9 June 2015).



Map 5-1: Location of HCV 4 within the Yaligimba concession and area of influence

Box 5: Ecosystem services in critical situations

Basic ecosystem services

Ecosystem services are the benefits people obtain from ecosystems, including provisioning services such as food and water, regulating services such as regulation of floods, drought, land degradation, and disease; cultural services such as recreational, spiritual, religious and other nonmaterial benefits; and supporting services such as soil formation and nutrient cycling.

Critical situations

An ecosystem service is critical where a disruption of that service poses a threat of severe, catastrophic or cumulative negative impacts on the welfare, health or survival of local communities, on the functioning of important infrastructure (roads, dams, reservoirs, hydroelectric schemes, irrigation systems, buildings, etc.), or on other HCVs.

Brown *et al* 2013

Ecosystem services are defined as “the benefits people derive from ecosystems” (www.maweb.org). Ecosystem services and critical situations are further defined in Box 5. There are several different types of ecosystem services (Landsburg *et al.* 2011). Brown *et al.* 2013 describes how these ecosystem services are relevant to HCV 4, HCV 5 and HCV 6 in a table, which is reproduced in Table 5.8. There are overlaps in some of these services and the HCVs into which they fall, these include especially water flow regulation and purification (HCV 4) and the provision of drinking water (HCV 5) (Brown *et al.* 2013).

Table 5.8: Types of ecosystem services and their relationship to HCVs 4, 5 and 6

HCV	Ecosystem Services	Examples of Ecosystem Services
HCV 4	Supporting and regulating services	Flood regulation
		Water purification
		Climate regulation
		Disease regulation
		Genetic resources
		Soil formation
		Nutrient cycling
HCV 5	Provisioning	Primary production
		Food
		Fresh water
		Wood and fibre
HCV 6	Cultural	Fuel
		Aesthetic
		Spiritual
		Educational
		Recreational

HCV 4 is usually linked to water resources, but where local communities are dependent on water resources, for example and there is a link between the ecosystem service and

potentially impacted (in critical situations) community, then the HCV is present (Paulina Villaipando pers. comm.). In Yaligimba, the local communities rely on the water resource; which is protected by forests. Loss of forests would result in the loss of this ecosystem in critical situations; however, the forests protecting these water resources are not found within the area of influence. There is the presence of a large flood attenuating floodplain on the western edge of the area of influence, and this forms HCV 4. However, it is not present within the concession area of Feronia. This is based primarily on the following key findings:

- The presence of extensive swamps (wetlands) and river systems including flood plains that regulate water provision and quality.

5.5 HCV 5: Community needs

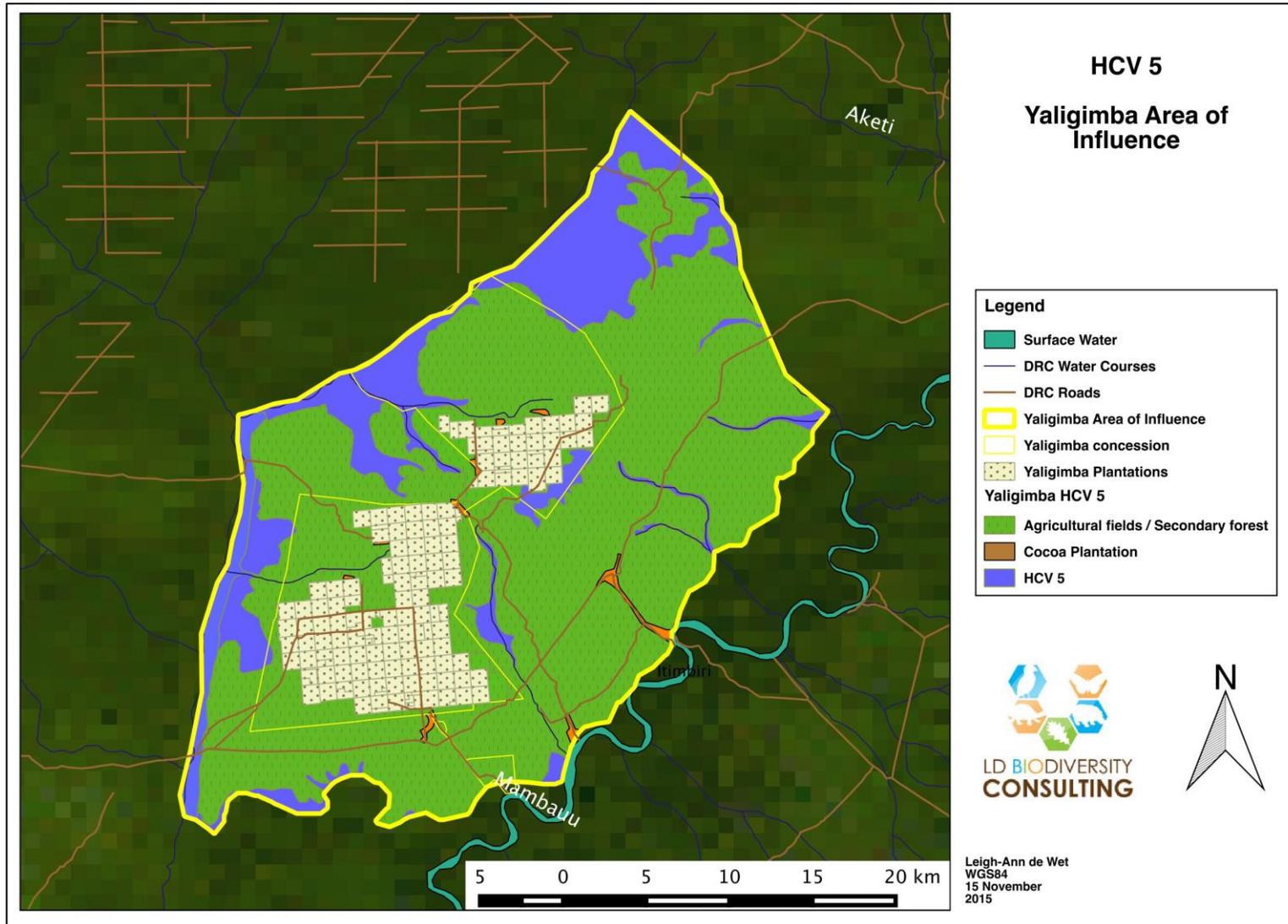
HCV 5 is assessed here based on criteria and thresholds developed by Brown *et al.* (2013), The Proforest Initiative (2012), Abell *et al.* (2013), and Paulina Villaipando, pers. comm. (9 June 2015). Each of the criteria, with references is shown in Table 5.9. The evidence used to determine the reasons for the HCV presence is then given below the table. The HCV is mapped (Map 5-2), where it occurs within the Yaligimba area of influence and in relation to the concession.

Table 5.9: HCV 5 matrix

Sites and resources fundamental for satisfying the basic needs of local communities or indigenous peoples (for example for livelihoods, health, nutrition, water), identified through engagement with these communities or indigenous peoples.					
Criteria	Threshold	Present	Absent	PA used	Reasons
Forest resources essential for the majority of the local population or poverty stricken members of the population if there is no other affordable alternative. ²	Food (bush meat, fruit, nuts) when it forms a fundamental part of the diet ^{2,1}				Reliance on these natural resources is high with fish and bush meat showing prevalence of reliance of 31% and 32% respectively.
	Forest products, which are not timber that provide steady income. ²				The community has identified fish and bush meat as providing income.
	Medicinal plants that are used in the absence of western medicine. ^{2,1}				Local people make use of traditional healers.
	Construction materials ^{2,1}				Houses not previously constructed by the oil palm company in workers camps are constructed of natural materials.
	Wood used for cooking and making kitchen				Fuel wood is the primary natural

Sites and resources fundamental for satisfying the basic needs of local communities or indigenous peoples (for example for livelihoods, health, nutrition, water), identified through engagement with these communities or indigenous peoples.					
Criteria	Threshold	Present	Absent	PA used	Reasons
	utensils. ^{2,1}				resource used, with 99% prevalence of reliance.
	Agriculture, which depends on the forest understory. ²				The local communities do not practice this form of agriculture.
	Hunting (even though this is completely illegal and destructive) ^{2,1}				Bush meat is shown to be important for the communities.
	Fish (as essential sources of proteins) and other freshwater species relied on by local communities ^{1,3}				Fish is an essential component of the diet of the community and reliance on fish is high.
	Fodder for livestock and seasonal grazing ¹				Few livestock are kept, and they graze around settlements, not within the forest.
	Water sources necessary for drinking water and sanitation ^{1,3}				The majority of communities rely on surface water resources for their water needs.
	Items which are bartered in exchange for other essential goods, or sold for cash which is then used to buy essentials including medicine or clothes, or to pay for school fees. ¹				Income generation from the sale of natural resources is important for the Yaligimba communities.

References for the table are given as ¹ Brown *et al.* (2013), ² The Proforest Initiative (2012), ³ Abell *et al.* (2013), ⁴ Paulina Villaipando, pers. comm. (9 June 2015).



Map 5-2: Location of HCV 5 within the Yaligimba area of influence

The Proforest Initiative (2012) states that the communities considered as dependent on natural resources (HCV 5) include:

- Communities far away from principle roads or centres of population;
- Communities far from clinics and medical posts; and
- Where the majority of homesteads are houses constructed of natural materials.

Indicators identified by Brown *et al.* (2013) include:

- “Access to health centres or hospitals is difficult;
- Most houses are built from, and household tools made from, locally available traditional/ natural materials;
- There is little or no water and electricity infrastructure;
- People have a low capacity to accumulate wealth (living “day to day”);
- Farming and livestock raising are done on a small or subsistence scale;
- Indigenous hunter-gatherers are present;
- There is presence of permanent or nomadic pastoralists;
- Hunting and/or fishing is an important source of protein and income; and
- A wild food resource constitutes a significant part of the diet, either throughout the year or only during critical seasons.”

“A site or resource is fundamental for satisfying basic necessities if the services it provides are irreplaceable (i.e. if alternatives are not readily accessible or affordable), and if its loss or damage would cause serious suffering or prejudice to affected stakeholders” Brown *et al.* 2013.

Sources of income identified by community consultation showed that wages from Feronia were the primary source of income, followed by the sale of crops. Reliance on natural resources for income, however, does occur. Natural resources include sales of fish, logging and bush meat. The breakdown of income sources is shown in Table 5.10 below, while Table 5.11 indicates the amount earned on average per month for each of the activities.

Table 5.10: Household sources of income with those resulting from natural resource use highlighted.

Type of income	Regular %	Occasional %
Salaries/wages	61%	6%
Crop sales	7%	30%
Sale of fish	0.3%	3%
Self-employment	4%	7%
Logging	2%	1%
Sale of firewood	0%	1%
Animal product sales (eggs / milk / etc.)	4%	10%

Type of income	Regular %	Occasional %
Livestock sales	1%	5%
Bush meat	0.6%	2%
Sale of medicinal plants	0%	0%
Migrant remittances	0%	0%
Tenants	0%	0%
Sale of building materials	0%	0%
Artisanal mining	0.3%	0%

Table 5.11: reported average sizes of income streams with income generated by natural resources highlighted.

Type of income	Regular (CDF)	Occasional (CDF)
Self-employment	343,000	21,000
Migrant remittances	20,000	10,000
Salaries/ wages	37,000	26,000
Sale of firewood		70
Crop sales	21,000	28,000
Artisanal mining	20,000	
Sale of fish	3,000	5,000
Livestock sales	9,000	31,000
Animal product sales (eggs / milk / etc.)	9,000	13,000
Bush meat	5,000	2,000
Logging	200	1,000
Tenants		40,000
Sale of building materials		
Sale of medicinal plants	2,000	

The tables above (natural resources are highlighted and referred to) show that there is a reliance on natural resources, as they are reported to form 2.9% of regular income, and 7% of occasional income for the local people. It is also reported that a regular average monthly income of 10 200 CDF and an occasional average monthly income of 8 070 CDF is earned from the sale of natural resources. Logging is the most common, with other income gained from the sale of fish and bush meat.

Reliance on natural resources is not restricted to sale and individual households will collect natural resources for their own use. The most commonly harvested natural resources are firewood, forest food products, medicinal plants, fish and bush meat. Table 5.12 shows the prevalence of reliance on natural resources, with Figure 5-1 indicating the frequency with which the natural resources are harvested.

Table 5.12: Prevalence of reliance on natural resources

Type of natural resource	Prevalence of reliance (%)
--------------------------	----------------------------

Type of natural resource	Prevalence of reliance (%)
Firewood	99
Forest food products (excluding meat)	93
Fish	31
Bush Meat	32
Medicinal Plants	60
Construction materials	42
Mushrooms	5
Snails, termites	3

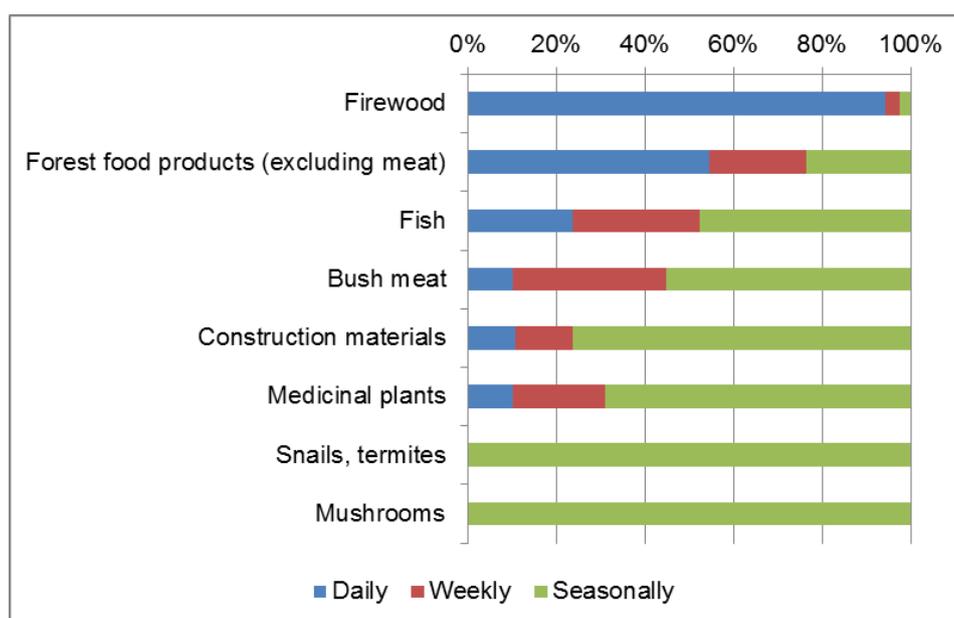


Figure 5-1: Frequency with which natural resources are harvested.

The collection of water is primarily from rivers or creeks, as well as from wells, showing a heavy reliance of natural water sources within the study site. In Yaligimba, 78% of the households use water collected from a river or creek and 21% from wells. The average walk required in order to fetch water within the Yaligimba study site is 44 minutes. Water is collected once every 2 days by 20% of households, one a day by 23% of households, twice a day by 37% of households, three times a day by 11% of households and more than three times a day by 8% of households in the wet season, with little change in the dry season.

As there is no electricity at the Yaligimba study site, firewood is heavily relied upon for cooking and fires are used for lighting (99% of households). 37% of the households in Yaligimba have gone to a traditional healer for ailments, indicating a dependence on medicinal plants.

Based on the information available from the social baseline study and the other desktop data available for the area, HCV 5 is present within the area of influence, and, to a lesser extent, the concession areas. The plantations themselves do not constitute HCV 5, however the secondary forests and disturbed areas of the study area do constitute HCV 5, riparian areas and swamps are also HCV 5. This is based primarily on the following key findings:

- The reliance of the local people on natural water sources;
- The reliance of the local people on timber forest products for income (logging, bush meat and fish) as well as for subsistence use (building materials, firewood).
- Reliance of local people on non-timber forest products (NTFP) for food and medicines.

5.6 HCV 6: Cultural Values

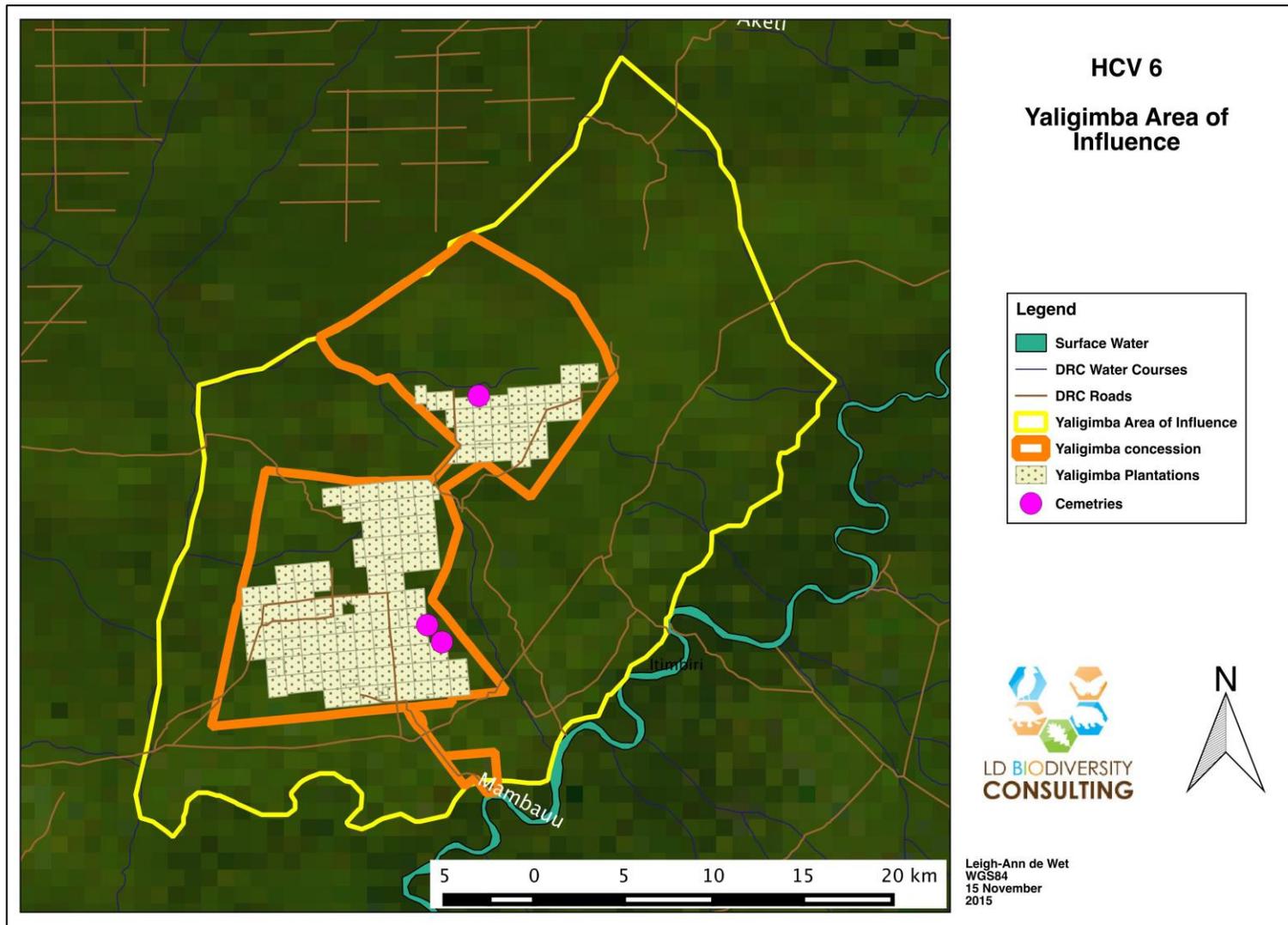
HCV 6 is assessed here based on criteria and thresholds developed by Brown *et al.* (2013), The Proforest Initiative (2012), Abell *et al.* (2013), and Paulina Villaipando, pers. comm. (9 June 2015). Each of the criteria, with references is shown in Table 5.5. The evidence used to determine the reasons for the HCV presence is then given below the table. It should be noted that limitations to the social study resulted in some limitations to the assessment of HCV 6 including identification of cultural values of forest areas.

Table 5.13: HCV 6 matrix.

Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.					
Criteria	Threshold	Present	Absent	PA used	Reasons
Cultural values of global or national significance ¹ .	UNESCO sites ¹				
	Caves and Ngovi Dimba ²				
	Matupi Caves ²				
	Depression Upemba ²				
	Wagneia falls at Kisangani ²				
Values critical for people at a local scale ¹ .	Cultural events linked to sites or forest areas ²				Sites such as these should be mapped using community consultation and participatory mapping processes. Limitations to the social studies for this assessment resulted in this not being completed at this time.
	Places, aboriginal sacred sites or lands (Groves, portions of rivers, waterfalls, cascades, caves) ² .				
	Totemic animals or trees ² .				
	Plants for magical-religious use ² .				

Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local communities or indigenous peoples, identified through engagement with these local communities or indigenous peoples.					
Criteria	Threshold	Present	Absent	PA used	Reasons
	Cemeteries ² .				

References for the table are given as ¹ Brown *et al.* (2013), ² The Proforest Initiative (2012), ³ Abell *et al.* (2013), ⁴ Paulina Villaipando, pers. comm. (9 June 2015).

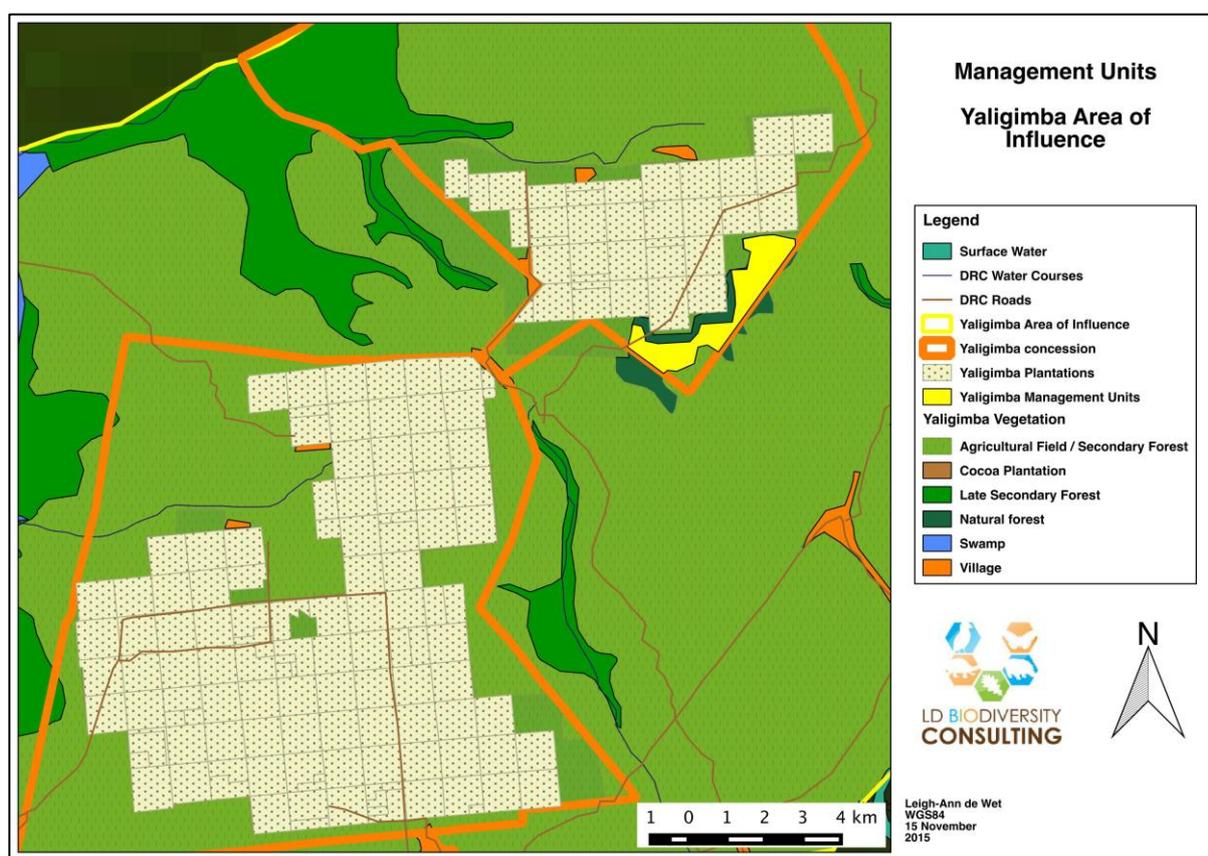


Map 5-3: Location of HCV 6 within the Yaligimba concession and area of influence.

The primary considerations for establishing the presence of HCV 6 are the presence of graves within the area of influence. It is recommended that future social assessments include participatory mapping as well as conversations with herbalists in order to determine additional HCV 6 sites which can then be mapped.

6 HCV Management and Monitoring

A threat assessment was conducted for each of the HCVs occurring within the Yaligimba area of influence using the threat assessment criteria in section 4.3. For each threat identified and rated, management measures have then been recommended. These measures are for the Management Units (MUs) present within the Yaligimba concession boundaries (Map 6-1). The MUs are formed only from HCVs present in the concession areas: Feronia has no scope beyond the borders of the concession and so management measures are recommended for MUs within the concession boundaries. Management units are defined as areas comprising natural forest that can be managed actively. General management measures required of the country specific HCV interpretations (The Proforest initiative 2012) are also provided in sections 6.1 to 6.6.



Map 6-1: Management Units for the Yaligimba Concession (MUs are restricted to within the concession area).

6.1 HCV 5

HCV 5 is considered to be present within the concession area. The threats to this HCV with associated management and monitoring recommendations are shown in below. Only threats that have more than a negligible impact on the HCV are discussed here.

Table 6.1: Threats, their impacts and management and monitoring recommendations for HCV 5 in the Yaligimba concession

Threat and description	Score			Total	Impact	Management recommendations	Monitoring recommendations
	Timing	Scope	Severity				
<p>Agriculture: shifting agriculture. Slash and burn agriculture is practiced by local people. Reduction of the available natural forest reduces natural resources available for use by communities.</p>	a	2	1	3	Medium	<p>A farming education program and initiative would enable local people to increase yields and productivity of their own fields, resulting in less of a need to clear additional fields. Family planning aid will help reduce population growth and thus the pressure to grow more food. In addition, paying the Feronia workers regularly and on time will reduce dependency on subsistence farming and the necessity to clear more land.</p>	<p>Monitoring of the increases in clearing for agriculture is recommended. Management measures can then be adapted accordingly. Monitoring can be done using satellite imagery.</p>

Threat and description	Score			Total	Impact	Management recommendations	Monitoring recommendations
	Timing	Scope	Severity				
Hunting and collecting terrestrial animals occurs, as the local people are reliant on bush meat.	a	2	2	4	Medium	A farming education program with a focus on reducing the reliance on bush meat and increasing the reliance on domestic animals would reduce the hunting pressure on these animals. It is unlikely that hunting for bush meat would be entirely stopped, but it can be reduced. An environmental program focusing on educating people about the importance of biodiversity should be considered.	A baseline for bush meat should be gathered, with a list of species killed, where these are killed or collected and how many of each species. Then the bush meat collection should be monitored regularly to determine changes in numbers of animals killed and rates at which they are killed. The places where they are caught are also important. This will allow for adaptive management to be applied.
Gathering terrestrial plants occurs for food and medicine. Large collections of particular species will reduce their abundance, resulting in the need for local people to go further and further for their collections.	a	2	1	3	Medium	Reliance on medicinal plants is small, as most of the local people will visit hospitals if they are sick. Reliance on forest food products is higher. Management should focus on education , for example reducing destructive collection wherever possible or growing food products as part of subsistence farming.	A baseline of the plants collected and their uses should be developed with the help of a local healer or herbalist. Collections of plants should then be monitored regularly in order to determine which species are collected and how these species respond over the years to collection pressure.

Threat and description	Score			Total	Impact	Management recommendations	Monitoring recommendations
	Timing	Scope	Severity				
<p>Logging and wood harvesting is prevalent as firewood is used regularly within houses for cooking and lighting. In addition, logging for larger species does occur. This reduces available resources.</p>	a	2	2	4	Medium	Logging for subsistence and trade occurs in the area of influence. Feronia states that they have no control over logging and no management will be done. The development and management of woodlots would provide firewood that is not from the forest.	Monitoring of the locations of logged trees as well as the numbers of trees felled should be done. The areas where firewood is collected should be monitored to ensure over collection is not occurring.
<p>Fishing and harvesting aquatic resources is prevalent in the study area. Overfishing is common.</p>	a	2	2	4	Medium	Fishing is one of the main natural resources used at Yaligimba. River systems have been disturbed within much of the concession area. An environmental education program would likely enable people to learn about overfishing. An aquaculture system should be investigated.	Monitoring of the fish caught should include species caught and numbers of each of the species. Thus a change in species caught as well as the numbers can be recorded over time.

6.2 HCV 6

HCV 6 is considered to be present within the study area. The threats to this HCV with associated management and monitoring recommendations are shown in below. It must be noted that the presence of HCV 6 for the purposes of this study is restricted to the presence of cemeteries. Additional important cultural sites may be identified at a later stage by further studies. The management of these should then be approached through community consultation and adaptive management.

Table 6.2: Threats, their impacts and management and monitoring recommendations for HCV 6 in the Yaligimba concession

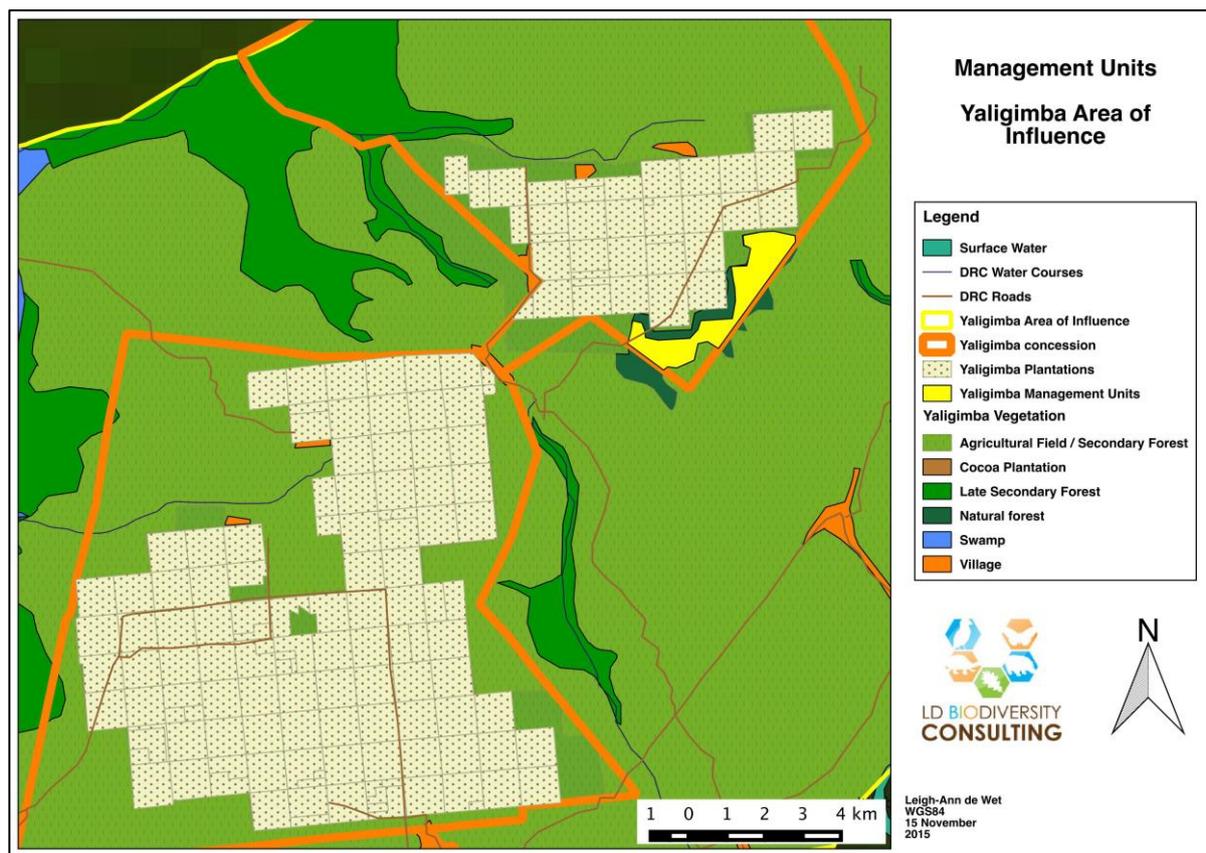
Threat and description	Score			Total	Impact	Management recommendations	Monitoring recommendations
	Timing	Scope	Severity				
Agriculture: planting of palm in cemetery areas.	c	0	0	0	Negligible	Avoid any future planting in cemetery areas. As no expansion is planned, this impact is likely to be avoided.	Make sure all cemeteries are mapped. Ensure that the location of any new cemeteries within the concession areas are defined in consultation with the local communities.
Agriculture: planting of palm in any other culturally important sites.	c	0	0	0	Negligible	Avoid any future planting in culturally important areas. As no expansion is planned, this impact is likely to be avoided.	Make sure all culturally important areas are mapped. Ensure that the location of any new culturally important areas within the concession areas are defined in consultation with the local communities.

7 Conclusion

Overall, of the HCVs, three are present in the area of influence (HCV 4, 5 and 6) with two, HCV 5 and 6 occurring within the concession area (Table 7.1). Feronia has control only within the concession boundaries, and as such, Management Units have been defined for the Yaligimba concession (Map 7-1). It is in these areas that the recommended management and monitoring measures should be focussed.

Table 7.1: Summary table of presence and absence of HCVs

HCV	Definition	Present	Absent
HCV 1: Species diversity	Concentrations of biodiversity including endemic species, and rare, threatened or endangered species (RTE), that are significant at global, regional or national levels.		
HCV 2: Landscape-level ecosystems and mosaics	Large landscape-level ecosystems and ecosystem mosaics that are significant at global, regional or national levels, and contain viable populations of the great majority of the naturally occurring species in natural patterns of distribution and abundance.		
HCV 3: Ecosystems and habitats	Rare, threatened, or endangered ecosystems (RTE), habitats or refugia.		
HCV 4: Ecosystem services	Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.	In area of influence, not concession area.	
HCV 5: Community needs	Sites and resources fundamental for satisfying the basic necessities of local communities or indigenous peoples (for livelihoods, health, nutrition, water, etc.), identified through engagement with these communities or indigenous peoples.		
HCV 6: Cultural values	Sites, resources, habitats and landscapes of global or national cultural, archaeological or historical significance, and/or of critical cultural, ecological, economic or religious/sacred importance for the traditional cultures of local peoples, identified through engagement with these local communities or indigenous peoples.		



Map 7-1: Management Units for the Yaligimba Concession (MUs are restricted to within the concession area).

Management measures are recommendations only at this stage, with prescriptive management measures forming part of a management plan, which needs to be developed following this HCV assessment specifically for the identified MUs. Management measures have been recommended based on past experience as well as those recommended by HCV documentation such as General Guidance for HCV Assessments (Brown *et al.* 2013) and the HCV in the DRC document (The Proforest Initiative 2012). Management and monitoring measures are recommended in Table 7.2.

Table 7.2: Management and monitoring recommendations for the Yaligimba concession MUs

Management recommendations	Monitoring recommendations
A farming education program and initiative would enable local people to increase yields and productivity of their own fields. Family planning aid will help reduce population growth and thus the pressure to grow more food. In addition, paying the Feronia workers regularly and on time will reduce dependency on subsistence farming and the necessity to clear more land.	Monitoring of the increases in clearing for agriculture is recommended. Management measures can then be adapted accordingly. Monitoring can be done using satellite imagery.

Management recommendations	Monitoring recommendations
A farming education program with a focus on reducing the reliance on bush meat and increasing the reliance on domestic animals would reduce the hunting pressure on these animals. It is unlikely that hunting for bush meat would be entirely stopped, but it can be reduced. An environmental program focusing on educating people about the importance of biodiversity should be considered.	A baseline for bush meat may be gathered, with a list of species killed, where these are killed or collected and how many of each species. Then the bush meat collection can be monitored regularly to determine changes in numbers of animals killed and rates at which they are killed. The places where they are caught are also important. This will allow for adaptive management to be applied.
Reliance on medicinal plants is small, as most of the local people will visit hospitals if they are sick. Reliance on forest food products is higher. Management should focus on education , for example reducing destructive collection wherever possible or growing food products as part of subsistence farming.	A baseline of the plants collected and their uses can be developed with the help of a local healer or herbalist.
Fishing is one of the main natural resources used at Yaligimba by the local communities. River systems have been heavily disturbed within much of the concession area. Fishing within the MUs may be controlled, either by prohibiting entirely, or applying fishing quotas. No barrages or dams should be constructed in this area.	Monitoring of the fish caught within the MUs could include species caught and numbers of each of the species. Thus a change in species caught as well as the numbers can be recorded over time.
All culturally important sites, especially those located in natural forest should be mapped in conjunction with the community through participatory mapping.	Presence and state of HCV 6 areas should be monitored through community consultation regularly.

In terms of meeting RSPO requirement, Feronia is required to adhere to the following:

- Identify specific MUs within the concession area;
- Develop and implement a management plan and associated maps for each of the MUs that can easily be applied by staff working on the ground;
- Develop and implement a monitoring plan for each of the MUs; and
- Do not expand into areas of little disturbed natural forest as per RSPO regulations.

When the site is audited for RSPO accreditation, this HCV document will be required to be produced along with associated maps and plans.

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