

**ASSESSMENT SUMMARIES AND MANGEMENT PLANS FOR THE
PROPOSED SAKPONBA NEW OIL PALM DEVELOPMENT,
ORHIONWON LGA, EDO STATE, NIGERIA.**



The land for the proposed new development at Sakponba

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SUMMARY

1 Overview and background

1.1 Description of location

The Sakponba concession which is being considered for sustainable oil palm development is located on a flat land in the Orhionmwon Local Government Area (LGA) of the Edo State of Nigeria.

1.2 Topography and landform

The topography of the Sakponba concession and its immediate surroundings are flat and predominantly grassland (typical of savanna grassland) with gallery forests and woodlands although it is in the forest zone of Nigeria. It is a highly-modified habitat consisting of extensive grassland dominated by beardgrass (*Andropogon gayanus*), elephant grass (*Pennisetum purpureum*) and Bermuda grass (*Cynodon dactylon*) which together constitutes about 60% of the total land area and is predominantly used for grazing of cattle by Fulani herdsman. The only water bodies that drain the land are the Nyanchia stream and a small unnamed stream both of are tributaries of the Ethiope River. The Ethiope River separates the Edo State from the Delta State and it flows from the north-east through to the south and lies about 50 metres to about 1.7 km away from the concession.

1.3 Description of the concession

The Sakponba concession is located ~ 55 km southeast of Benin City, in Edo State of Nigeria. The four boundary corners of the concession are: NW (Long 5° 54'E, Lat 5°49' N), NE (Long 6°03'E, Lat 5° 50'N); SE (Long 6°05'E, Lat 5°48'N) and SW (Long 5° 55' E, Lat 5° 45' N). The concession is bordered to the north by the heavily degraded Urhonigbe Forest Reserve, to the south by farmlands and the Ethiope River, to the east and west by local people's farmlands and the Ethiope River. The concession was acquired by Presco Plc through a Deed of Assignment from His Royal Majesty Omon N' Oba N' Edo Uku Akpolokpolo, Oba Erediauwa (The Oba of Benin) on 19th December 2011. The concession area was assessed for High Conservation Values (HCVs) and High Carbon Stocks (HCS). The HCV assessment team findings concluded that HCVs 1, 3, 4, 5 and 6 are present in the concession. The five categories of HCVs and their management areas altogether cover 136 ha which have been recommended for set-aside and precluded from conversion and all forms of oil palm development activities. It should also be noted that some of the HCV 5 and 6 areas identified such as the Ekukusu (HCV5), the Ezenurwor (HCV 5) and Egbon-ogiougo (HCV6) are outside of the concession but have been mapped as a result of the concern of the proposed project affecting those HCVs due to their proximity to the concession. The HCV management recommendations proposed by the HCV assessors have been accepted by the management of Presco.

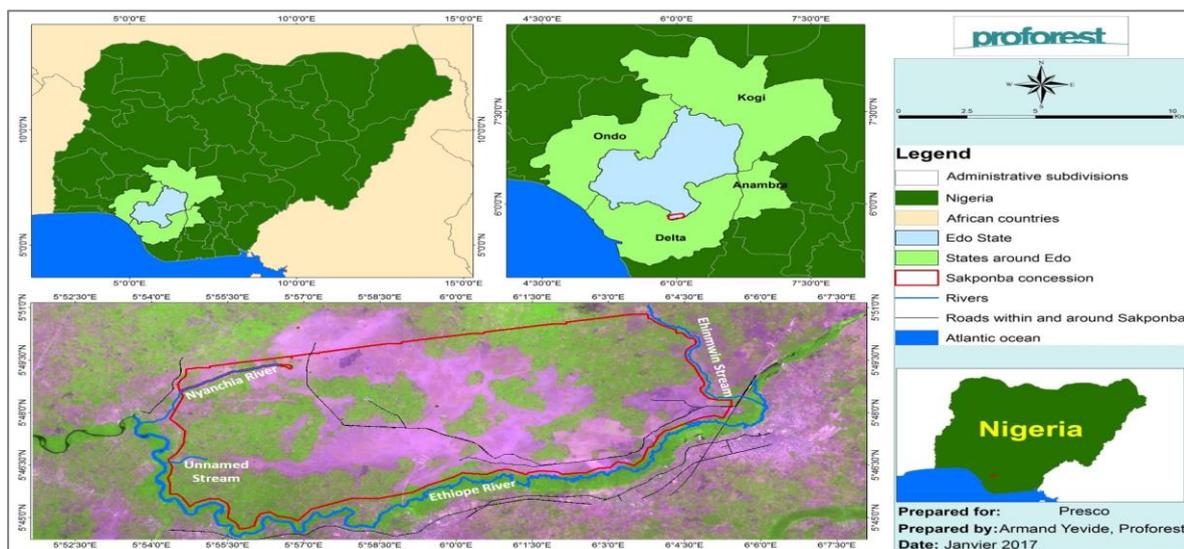


Figure 1: Location of Presco Sakponba concession in Edo State of Nigeria

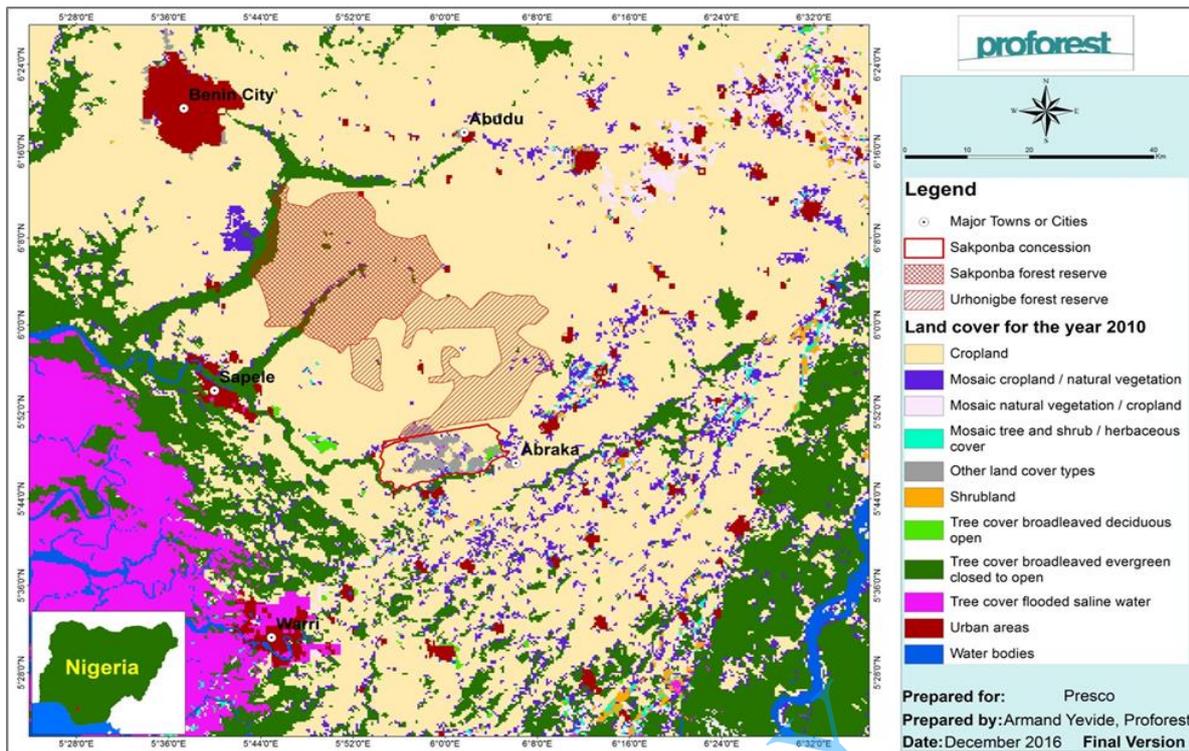


Figure 2. Location of Sakponba concession within broader landscape showing a mosaic of forest patches in wide expanses of mixed grassland and cropland. Sakponba and Urhonigbe Forest Reserves are also shown. Land cover for the year 2010. Collected field data; Land cover data is at a spatial resolution of 300 m and is taken from the ESA's 2010 global land cover map (<http://maps.elie.ucl.ac.be/CCI/viewer/download.php>)

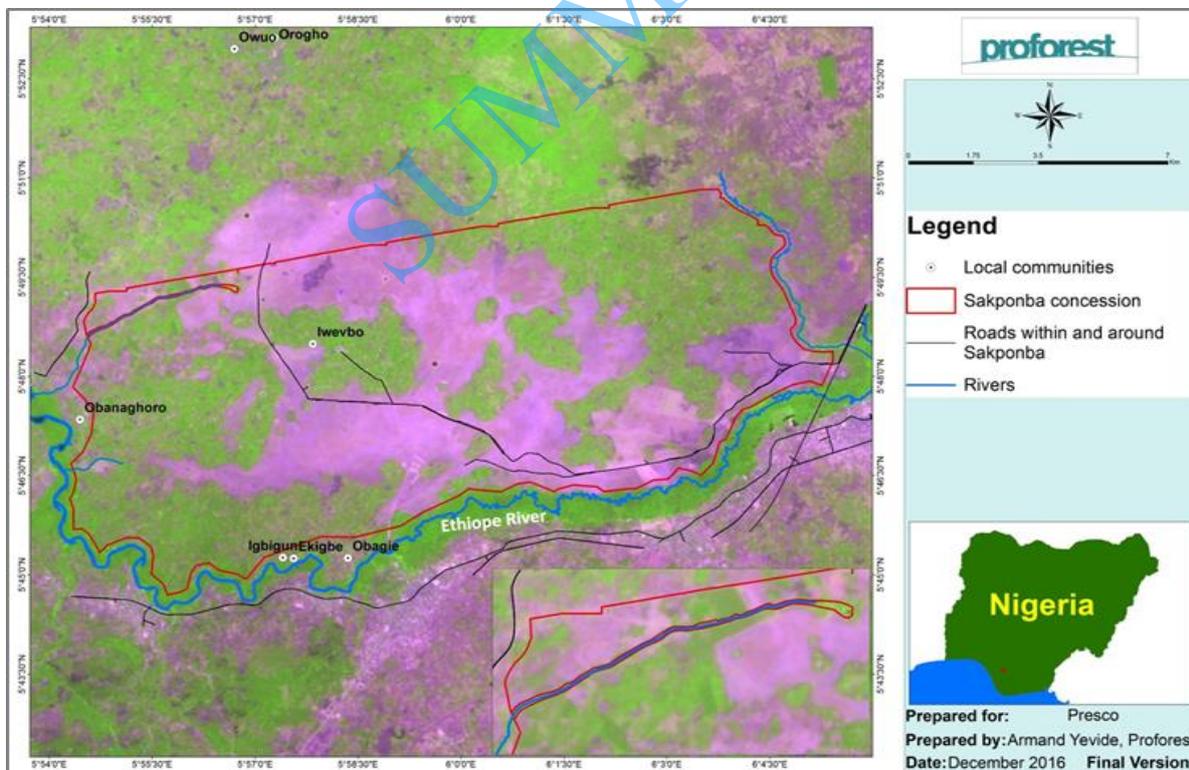


Figure 3. Map of Sakponba concession with nearby communities and the Ethiopie River

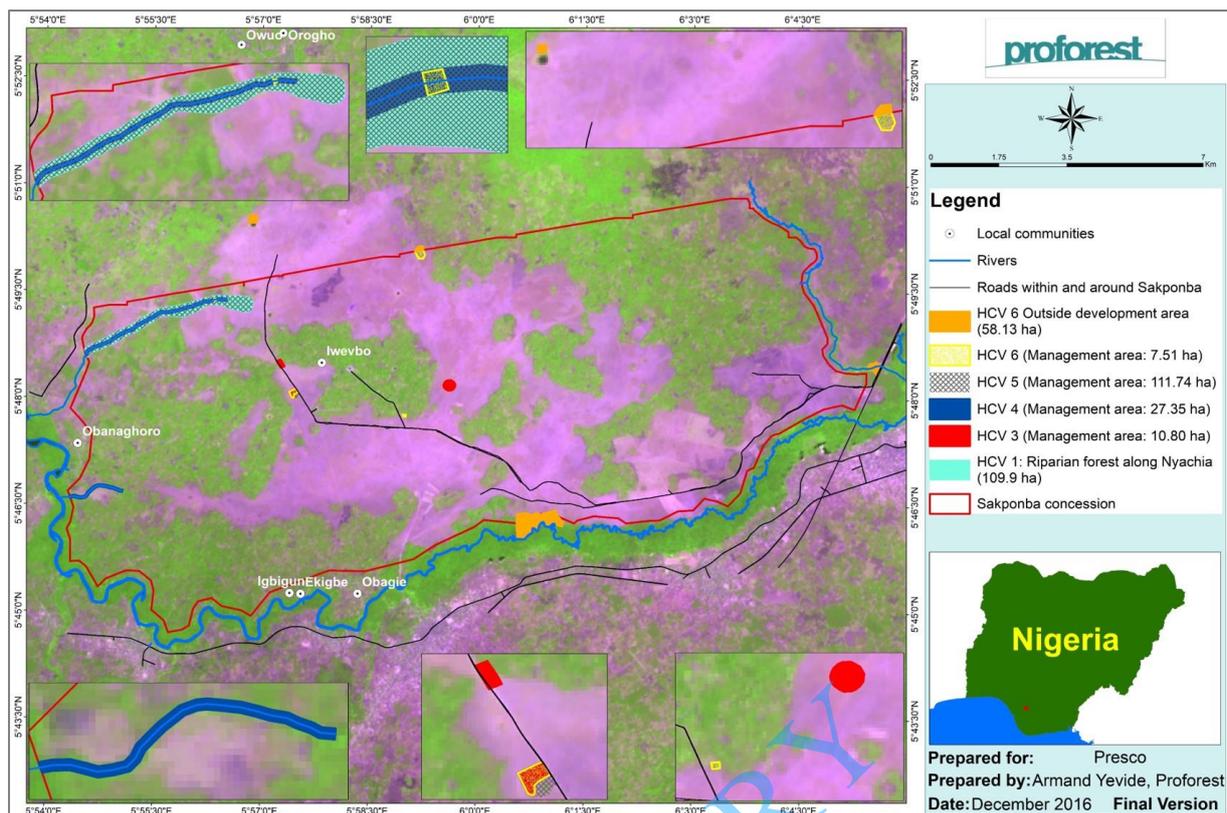


Figure 4: The Sakponba concession showing all the HCVs identified and their management areas

NB: The inserts on this figure show how the different HCVs overlap with each other and the areas that stand alone.

The total concession area and summary of the proposed areas to be developed, HCV management areas and set-aside areas for farming are:

Total concession area: 14, 436 ha

HCV and their management areas: 136 ha

Extra buffer zones: 126 ha

Other conservation areas: 120 ha

Total area to be developed: 14,055 ha

2. Assessment process and methods

2.1 HCV assessment process and methods

Date of assessment

Proforest was contracted in October 2015 to conduct the HCV assessment. Proforest team carried out a scoping study in November 2015 but the full assessment did not start until October 2016 due to re-demarcation to excise part of the concession area as future farmlands for the local communities. Field assessment including biological surveys and stakeholder consultations commenced in October 2016 and were completed in December 2016. The peer review was completed on 23rd February 2017, Quality Panel review was completed on 28th March and the public summary posted on HCV Resource Network website on 29th March 2017.

Assessors and their credentials

The HCV assessment team consisted of 9 specialists with diverse academic and professional background and vast experiences appropriate to the task. The team consisted of professionals from various fields including biology, ecology, botany, sociology, ornithology, forestry and GIS mapping. The specialist members of the team and their roles in the assessment is presented in Table 1 below.

Table 1. The HCV assessment team

Name	ALS License	Institution	Role	Expertise
Abraham Baffoe	Fully Licensed ALS15006AB	Proforest	Team Leader	Forest Ecology, and social expert
Dr. Michael Abedi-Lartey	-	Proforest	Team member	Fauna expert, Forest Ecology, GIS/mapping
Dr. Emmanuel Danquah	-	KNUST	Team member	Ornithologist and mammal expert
Dr. Armand Yevide	-	Proforest	Team member	GIS/Mapping/ Hydrology
Aristotle Boaitey	-	Proforest	Team member	Social, stakeholder engagement, participatory mapping
Joseph Ugbe	-	Independent Consultant	Team member	Forest inventory, botanical survey
Akomaye Ashikem	-	Independent Consultant	Team member	Forest inventory, botanical survey
Dr. Adesoji A. Adeyemi	-	Independent Consultant	Team member	Forest inventory, botanical survey
Gabriel Teye-Ali	-	Independent Consultant	Team member	Community mapping and engagement social expert

The HCV assessment methods used

The methods for the HCV assessment included collection of both primary data through field assessments and engagement with stakeholders and a secondary data from literature reviews. In order to inform the field data collection methods, the secondary data was largely collected during the pre-assessment and scoping stages of the assessment and prior to the main field assessment.

Secondary data collection

The gathering and analysis of secondary data occurred during the planning and pre-assessment phase and it included land cover analysis, ecosystem mapping species data, socio-cultural data and topographical data were collected and analysed.

- **Species data:** In order to facilitate field assessment of HCVs 1 and 2, secondary data on HCV 1 species potentially present in the wider Lower Guinean Forest within which the concession is located were extracted from the IUCN Red List and the Status of wild flora and fauna as contained in the "Convention on Biodiversity 4th National Report of Nigeria (2010). These tables were cross-referenced and augmented by the information from the field assessment and consultation with experts and community groups with knowledge of the area and species likely present.
- **Land cover:** To assess HCV 1-4, historical and present forest and other land cover were assessed from satellite imagery. The land cover classification was based on a 30 metres resolution satellite imageries acquired from the EarthExplorer webpage of the United States Geological Survey (USGS). The satellite images were analysed and confirmed using images from previous years. This land cover mapping informed the field survey sampling design for the full field assessment.

- **Topographical data:** Presco provided contour maps of the area which the HCV assessment team used to define the general topography and slopes in the concession. This information was also used to inform the definition of erosion potential of the concession area
- **Sociocultural data:** The secondary data for the assessment of HCV 5 and 6 were available from Environmental and Social Impact assessment draft report which provided useful information including the of number of communities that would be potentially affected by the proposed project and their respective populations.

Primary data collection

- **Field verification of land cover types and topographical condition:** In order to confirm land cover types and topographical conditions, general field observations were made throughout the concession during the scoping study and prior to the field data collection.
- **Flora survey:** Using a stratified systematic random sampling approach, a total of 119 plots were laid on the concession of which 56 were surveyed because about 63 of the 119 plots fell in the extensive 100% grassland areas without plants and therefore were not surveyed. However, grassland plots that contain plants were surveyed and this ensured that specific plant species limited to the grassland areas were captured. This grassland which the local people savanna covers about 6,300 ha of the concession area to the north-east and south. The flora survey was carried out in the fallow land, farmlands, riparian vegetation and the degraded patches of forests. This represents a sampling intensity of 1% of the total area. Using mostly existing road and trails as baselines, 500m x 20m (i.e. 1 ha) sample plots were placed at 500 m intervals and in a south-north direction with the aid of GPS and a compass. Data and information on plants within 10m from both sides of the 500m transect within the plot were recorded for each plot.
- **Fauna survey:** For the survey of fauna, a grid consisting of survey plots, each 2 km x 2 km, was superimposed on a map of the concession using GIS applications. Seventeen (17) plots were systematically selected (50%) and fauna surveyed from the major vegetation types including the grassland areas along paths of least resistance (existing trails) within each plot. A minimum of one kilometre of trails and paths was randomly sampled in each plot. An average of one 500m trail or footpath per square km was maintained to ensure a uniform distribution of survey trails within plots. This plan conformed to a *systematic* design. As much as possible, trails and paths were networked to cross drainage lines of the area to incorporate many land cover types (Norton-Griffiths 1978). Surveys were conducted in the morning to mid-afternoon (06:00 – 16:00). A statistical software package, EstimateSWin800 Version 8.0.0 (Colewell, 2006), was used to determine indices of fauna diversity and richness in the various land-use types in the concession.
 - **Mammals:** Information on large mammals were systematically obtained by direct observation and record of signs (vocalizations, droppings and footprints) along transects. Additional information was obtained by interviewing local people, particularly hunters. Pictures in field guides (e.g. Stuart and Stuart, 2006; Happold & Happold, 1990) were shown to the local people to help in the identification of the mammals; it also gave the opportunity for others to corroborate or challenge the authenticity of information given. Small terrestrial mammals survey involved direct observations on transects. The main reference for identifying mammals was Hughes (1988) and Happold & Happold (1990) respectively.
 - **Birds:** Bird surveys were conducted along transects. Direct observations, including visual as well as vocal records were made to determine bird species occurrence. Additional information was obtained from local people through interviews. Pictures in the field guide (Barrow & Demey, 2008) were used to show the local people to help in the identification.

- **Reptiles and amphibians:** Herpetofauna surveys involved systematic refuge examinations (searching under rocks, logs, in rotten tree stumps, in leaf litter, old termite mounds and rodent burrows) along line transects. Special attention was given to riparian vegetation and other favourable habitats, to discover as many species of amphibians and reptiles as possible. All the captured and identified specimens were released as soon as possible at the point of capture. Many specimens were identified on site. Some specimens, particularly those that could not be identified conclusively in the field, were collected and preserved for later identification in the laboratory. The main reference for identifying herpetofauna was Hughes (1988).



Figure 5: Consultative meeting at Obagie



Figure 6: Participatory mapping at Obanakhoro

- **Social and cultural surveys to assess HCV 5 and 6:** Several communities and town hall meetings including Focus Group Discussions (FGD) were held to engage with local communities and using prepared questions, collected information and evaluated the dependency of community members on natural ecosystems to fulfill basic needs (HCV 5) and identify presence of any important spiritual, traditional or cultural sites (HCV 6). The consultative public meetings were held in all seven communities (Orogho, Owuo, Obanakhoro, Obagie, Iwevbo, Igbigun and Ekigbe) involving a cross-section of all stakeholder groups present, including traditional leaders, elders, women, youth groups, farmers, fishermen, hunters and other identifiable groups. The participatory mapping was helpful as it allowed the communities to identify their use areas within the landscape on a map. If the communities were dependent on natural resource in the landscape, the participants sketch a map to illustrate the location.

2.2 Environmental and social impact assessment

Dates Environmental and social impact assessment (ESIA) were conducted

The Environmental and Social Impact Assessment (ESIA) process of the proposed Sakponba plantation project which was conducted by Foremost Development Services Ltd started in the second Quarter of 2016 and was completed in early 2017 with final reports submitted in March 2017.

ESIA Assessors and FPIC experts and their credentials

Name of Consultant	Qualification	Role played
Mr F. A. Afolabi	M. Sc. Development Planning	Overall job execution and delivery
Dr Samuel Dare	PhD Socio-Cultural Anthropology and Rural Sociology	Team leader, Social Impact Assessment
Mr A. A. Olanigan	MSc Environmental Management and Protection	Operation and project coordination
Professor Chris Oke	PhD Forestry and Wildlife	Flora and Fauna studies
Henry Okeke	MSc Remote Sensing and Geographic Information System	GIS expert
Dr Femi Oyediran	PhD Environmental Management & Protection	Environmental monitoring, determination of sampling control points, Air quality, water quality, noise measurements, field work coordinator
Dikeocha Festus Awarra	BSc	Assessor
Clement Imoh	HND	Assessor
Makinde Abiodun	BSc	Assessor

ESIA methods

Secondary data

Data and information gathering from literature entailed the following:

- a. Background information on the oil palm industry in Nigeria was obtained from the Nigerian Institute for Oil Palm Research (NIFOR) and other technical notes from the Agriculture and/or Plantation department of Presco Plc.
- b. The relevant institutional, legal and regulatory framework was obtained from publications by the regulatory agencies and ministries.

- c. The Ologbo Plantation Expansion and Ologbo Plantation Extension Final EIA reports 2014 and 2016 respectively (Approved by the Environmental Assessment department of Federal Ministry of Environment, Abuja) as secondary data.
- d. The most recent relevant meteorological records were obtained from Presco Plc:

Primary date

Period of Field Data Gatherings

Preliminary field study actually started in 2nd February, 2011 when an exploratory soil survey process was conducted by Presco Plc. The major objective was to determine the suitability of the proposed location for large scale cultivation of rubber and oil palm. However, for the EIA proper, after completing the scoping, the wet season field data gathering including environmental parameters such as water quality, air quality, noise level, air temperature, vegetation type, and plant form/species started on 26th to 29th September 2016 as witnessed by Federal Ministry of Environment official from Abuja, both days inclusive. Social Impact Assessment (SIA), data on socio-economic characteristics and land use were obtained between 14th and 19th December 2016. There was no need for the second season (dry season) data gathering again because Federal Ministry of Environment had granted the consultant's request for one season data.

2.3 Soil suitability assessment

Dates soil suitability assessments were conducted

An exploratory soil survey process was conducted in February 2011 in which the existing road network was exploited as traverses across the land, from the north to the south. Sampling points were random but guided by the collective influence of vegetation and topography on soil variability. At each sampling point, laboratory samples were collected at depths 0-30, 30-60, 60-90 and 90-120cm totaling 20 samples. Necessary morphological features were recorded at each point.

Soil suitability assessment experts and their credentials

The soil exploratory soil survey was led by Dr. Umweni A. Sam

Soil suitability assessment methods

The soil assessment methodology was largely that associated with exploratory surveys in which existing road network was exploited as traverses across the land, from the north to the south. Sampling points were random but guided by the collective influence of vegetation and topography on soil variability. At each sampling point laboratory samples were collected at depths 0 – 30, 30 – 60, 60 – 90, and 90 – 120cm totalling 20 samples. Necessary morphological features were recorded at each sample point.

The findings of the soil survey suggest that the soil of the Sakponba concession is moderately acidic with slightly moderate texture. The organic carbon, total nitrogen and available phosphorus, calcium, potassium, sodium and magnesium were found to be low. The findings also suggest that the According to studies carried out by CIRAD specialists, Sakponba concession is suitable for oil palm development with applications of organic, inorganic or combination of both fertilizers.

2.4 High Carbon Stock assessment

Dates High Carbon Stock assessment was conducted

The Carbon Stock assessment was conducted on October-December 2016.

High Carbon Stock assessment experts and their credentials

The Carbon Stock assessment was led by Dr Sedami Igor Armand Yevide and he was assisted by Dr Michael Abedi-Lartey, Abraham Baffoe, Ashikem Akomaye, Adesoji Adeyemi and Joseph Ugbe.

- **Dr. Sedami Igor Armand Yevide:** Armand holds a PhD in Natural Resources Management and spent about 2 years as post doctor at the Institute of Remote Sensing and Digital Earth (RADI) working for the United Nations Environment Programme-International Ecosystem Management Partnership (UNEP-IEMP) under the Chinese Academy of Science's International Young Scientist Programme. He has a number of scientific publication on the ecology, dynamic, productivity and tree growth modelling of natural and man-made forests, ethnobotany, biodiversity and ecosystem monitoring network with a special focus on Africa.
- **Abraham Baffoe:** Abraham has more than 18 years' experience working on natural resource management, specialising in sustainable forest management, certification and forest policy. His experience involves managing community forestry projects, developing and implementing forest certification programmes and providing support to sustainability standard setting and policy implementation.
- **Dr Michael Abedi-Lartey:** Michael specializes in conservation and natural resources management, with over 21 years of extensive experience in several countries in West Africa, including Ghana, Cote d'Ivoire, Liberia Togo and Burkina Faso. After obtaining a BSc in Natural Resources Management (KNUST, Ghana) in 1994, he held various technical and senior management positions over the next 12 years with the Ghana Wildlife Department (Forestry Commission), including running a zoo, national park, the national bio-monitoring unit, and monitoring and evaluation.
- **Akomaye Ashikem:** Ashikem has several years of experience working with the Cross-River State Forestry Commission (CRSFC) as Forest Officer responsible for forest inventories. He has more than 10 years of experience in biodiversity assessment especially in monitoring economically valued tree species in the forests of Cross River State. He has participated in several HCV assessments undertaken by Proforest in Nigeria including in Edo and Cross River States. He has also participated in two HCV trainings conducted by Proforest.
- **Joseph Ugbe:** Joseph has several years of experience working with the Cross-River State Forestry Commission (CRSFC). He has more than 10 years of experience working as the research expert in both wildlife and plants with special focus on aquatic species. Joseph has participated in several HCV assessments undertaken by Proforest in Nigeria including in Edo and Cross River States. He has also participated in two HCV trainings conducted by Proforest. He currently holds a position of *Higher Forest Superintendent* at the Cross-River State Forestry Commission.
- **Adesoji Akinwumi Adeyemi:** Adeyemi is a *Senior Lecturer* in the Department of Forestry and Wildlife Technology of the Federal University of Technology in Nigeria. He has extensive experience in Forest Inventory and Biometrics with competences in Forest Mensuration and Measurement, Botanical Survey and Species Identification, Forest Ecology, Biodiversity Assessment and Monitoring, Fauna Survey, Wildlife Population Analysis, Conservation, Forest Management, Remote Sensing/GIS, and a PhD in Forest Resources Management.

High Carbon stock assessment methods

Secondary data: A desk review of documents including paper and cadastral maps provided by Presco was carried out prior to the field assessment. Presco provided maps of its Sakponba concession in Edo State. In planning for the assessment, a combination of satellite images of the wider landscape was used. This included publicly available Google Earth imagery which were used in the initial planning for the assessment. Satellite imageries were thereafter used to aid the assessment of the study area and to determine the land cover classes in the area.

Primary data: Prior to carrying out the botanical survey and carbon stock estimation, the team conducted ground-truthing which was aimed at verifying the accuracy of the land cover classification conducted using the satellite images. An approximately 1% sampling rate was used to determine the sample size for the estimation of the total carbon stock for the proposed concession. 116 sampling plots were laid across the proposed concession. These plots were distributed along 39 transect lines oriented North South and, which were at least, a distance of 500 m from each other. Each plot was a rectangle of 1 ha (length 500 m and width 20 m) which was subdivided into 25 quadrats of 20x20 m (400 m²) each. At the starting points of each plots, a bearing was taken with a compass when surveying the quadrats to keeping the South direction fixed and effectively walk along the transect line. Data collected from the plots included the name of the species, diameter at breast height, and observation on the individual tree (whether it was diseased, fruiting, etc). Only live trees and lianas with trunk diameter at breast height (dbh) ≥10 cm were measured, using a diameter tape. In addition to the dbh measurements, the height of each individual tree was estimated visually. Each quadrat within the plot was assigned to a one of the vegetation types obtained after the land use and land cover classification. The number of quadrats in each vegetation type was used to estimate its area within the entire concession.

2.5 Land Use Change assessment

Dates land Use Change assessment was conducted

The Land Use Change assessment was conducted in October and December 2016.

Land Use Change analyst credentials

The Land Use Change analysis was carried out by Dr Sedami Armand Yevide, see above for Dr Sedami's credentials.

Land Use Change assessment methods

Image acquisition

The United States Geological Survey (USGS) provides through its EarthExplorer website (<http://earthexplorer.usgs.gov/>) several remote sensing data including Landsat satellite images that exist in various types. For the land use change analysis of Sakponba concession landscape, Landsat 7 and Landsat 8 were downloaded, pre-processed and classified. The Landsat 7 Enhanced Thematic Mapper has a ground resolution of 30 meters. It records data in seven different bandwidths. These bandwidths are broken down into portions of the visible, infrared, and thermal infrared regions of the electromagnetic spectrum. The land use and land cover features were mapped using a false colour composite image (FCC, bands 5, 4 and 3) at various scales. Landsat 8 carries an Operational Land Imager (OLI) and a Thermal Infrared Sensor (TIRS) instrument on board. Landsat OLI image data consists of nine spectral bands with a spatial resolution of 30 meters for Bands 1 to 7 and Band 9. The resolution of Band 8 (panchromatic) is 15 meters. Landsat 8 provides a new data source for monitoring land cover, which has the potential to significantly improve the characterization of the earth's surface. Land use and land cover features were mapped using a false colour composite image (FCC, bands 6, 5 and 4) at various scales. Sakponba concession is mostly contained within Landsat path 189, rows 56. Five scenes or tiles of clear and almost cloud-free images were selected for the classification. These data were preprocessed by atmospheric correction, i.e. the removal of atmospheric distortions in the imagery due to differences in aerosols, water vapour, haze, and illumination effects. This was done with QGIS. The output data was converted into surface reflectance. The images are procured in Level 1T preprocessing format, which means that geometric correction including orthorectification has already been applied by USGS. The images had a very good geometric matching for land use change analysis. Each Landsat image were preprocessed separately because of the different acquisition dates.

Image classification

The land cover classification was done with ArcGIS which uses an object based image classification method. During the HCV and CS assessments conducted in October 2016, ground truthing data was collected and used as training sample through the maximum likelihood algorithm to classify the vegetation of Sakponba landscape for the year 2016 into six classes (Farmland, Grassland, Low to Medium Density Forest or Shrubland, Plantations, Riparian forest, and Water bodies) with an overall accuracy of 95.8% and a Kappa coefficient of 94.3%. However, for consistency reason and due to the unavailability of ground truthing data for the other years, four land use and or land cover classes were used to classify or reclassify the acquired images (see table below).

Table 2: Description of the land use or land cover categories used for the classification

Land use/land cover classes	Description
Riparian forest	Land covered by a natural woody vegetation along a river. This vegetation is degraded and has a low tree density.
Grassland or Open land	Land covered by grass or buildings and other man-made structures, including barren lands with exposed soil, sand or rocks.
Water bodies	Natural water bodies and artificial water bodies - seas, lakes, reservoirs, and rivers. Can be either fresh or salt-water bodies.
Other vegetation types (This includes farmlands, shrubland and plantations based on the land cover map of 2016)	Land characterized by scattered trees in a mosaic of cropland, shrubland and oil palm plantation.

The land cover map for the year 2016 were reclassified and used to generate training sample for the classification of the other Landsat images. Eventually, a visual screening of the classification results was conducted in order to reduce mis-classifications and improve classification accuracy. Following the classification of imagery from the individual years, a multi-date post-classification comparison change detection algorithm was used to determine changes in land use in three intervals, 2005–2007, 2007–2009, 2009–2010, 2010–2014, 2014–2016 and 2005–2016.

2.6 Greenhouse Gas analysis

Dates Greenhouse Gas analysis was conducted

The field work for the Greenhouse Gas assessment was conducted in December 2016 with analysis and reporting completed in March 2017.

Greenhouse Gas analyst credentials

The Greenhouse Gas analysis was carried out by Dr Sedami Armand Yevide, see above for Dr Sedami's credentials.

Greenhouse Gas analysis methods

The four scenarios used were run using the New Development GHG Calculator provided by RSPO and downloaded from the link below: <http://www.rspo.org/certification/ghg-assessment-procedure>. The calculator was populated with previous years data for the mill to which the proposed crop will be delivered to. Data for 2015 and 2016 were provided by Presco which were used for the GHG assessment.

3 Summary of findings

3.1 ESIA summary findings

From the social economic study it can be concluded that there is potential and significant impacts of the project towards social sustainability for affected communities. The immediate activities that have impact on social sustainability are the recruitment of workers for plantation development such as land clearing and development and capacity/skill development programmes for the youths. Regarding the company's plans, the immediate impact of recruitments would be experienced by the thousands of people and hundreds of households residing in the nearby communities. At the moment the impact is not limited to employment at the nursery, but includes Presco Plc corporate social responsibility being discharged gradually through the engagement of more than 200 persons for short term employment. The study showed that except Orogho community, there is little presence of government social facilities and infrastructure. The result of baseline analysis in relation to the assessed communities can be summarized as that the two communities (Orogho and Owuo communities) are dominated by Bini speaking people with similar culture in the way of greetings, marriage, tradition and other norms, mores and values and they tend to be more bonded by the common interests they share as farmers; and the remaining four communities are dominantly Urhobo speaking people. Some of the anticipated/potential positive socio-economic benefits include creation of employment, introduction of high yielding varieties of oil palm and sustainable management of palm plantation practices, training and capacity building for employees and smallholders, revenue to local communities through royalties payment to landlord communities, tax revenue for the Edo state government and commercial opportunities for small and medium scale enterprises including petty trading. While some of the likely negative impacts include; loss of farmlands, forest products collection areas, impacts on food security and prices of food products, influx non-native plantation workers and potential impacts on family structures and social networks, water pollution due to agro-chemicals, pollution from hazardous substances, exposure to health risks (e.g. HIV, sexually transmitted diseases), adulteration/dislocation of indigenous cultural values, impacts of operations on infrastructure (roads, water) and potential conflicts with farmers whose farm lands have been taken over and without acceptable resettlement plan in the action plan designed for security challenges.

The findings of the EIA indicate that discharges including gaseous emissions and noise are expected from the operation of the plantation development project. However, any such discharges, which can be considered as potential sources of adverse environmental effects, can be fully managed through the proposed preventive actions and mitigating measures. There would appear to be no legal, administrative, natural and socio-economic limitations to prevent the Sakponba oil palm and rubber plantation development project from going ahead as proposed by Presco Plc. The project shall be implemented in accordance with the proposed environmental management plan (EMP). An EMP involving environmental management and supervision organizations, and environmental monitoring has been established to ensure the environmental performance of the Project. To ensure successful implementation of these measures, the EMP covers major relevant aspects such as institutional arrangement for environmental management and supervision and environmental monitoring. With implementation of the mitigation measures defined in the EIA and EMP, all the likely adverse environmental impacts associated with the project will be prevented, eliminated, or minimized to an environmentally acceptable level. It is therefore recommended that Presco Plc should implement the proposed oil palm and rubber plantation development project at Sakponba by fulfilling its obligations as outlined in the respective social and environmental management plans in this report.

Potential positive impacts

The following are some of the potential positive socio-economic benefits of the Proposed Oil-palm and Rubber development at Sakponba.

- a. **Creation of employment:** The proposed project if implemented can create thousands of new jobs. The various activities including nursery development and oil palm seedling maintenance, plantation land preparation, planting and harvesting are all labour intensive and can also provide employment to the affected communities; a potential tool for reducing rural unemployment and rural poverty. From the findings of socio-economic survey, the proposed project has started creating short term employment opportunity for the affected communities for instance, 15 persons engaged from Obanakhoro, 25 persons from Owuo and 200 persons engaged from Orogho communities.
 - i. Introduction of high yielding varieties of oil palm and sustainable management of palm plantation practices. Four of the six assessed communities have oil palm as their main crop and with Sakponba estate of Presco, the opportunity avails them best management practices (BMP) for their plantation and possible increase in fresh fruit bunches (ffbs) yield.
 - ii. Training and capacity building for employees and smallholders
 - iii. Revenue to local communities through payment of royalties to landlord communities
 - iv. Tax revenue for the Edo state government
 - v. Potential for smallholder schemes
 - vi. Commercial opportunities for small and medium scale enterprises including petty trading
- b. **Educational opportunities:** Presco Plc is not just a production company but partly a knowledge industry that employs best practices in the delivery of world class service and products. Consequently, working in and around these communities will lead to technology and knowledge transfers and training within and among community members.
 - i. Infrastructural development: It is hopeful that as part of corporate social responsibility, Presco Plc will be involved in different infrastructural development projects for the affected communities. In 2015, Presco graded the Owuo feeder roads as part of CSR. It was obvious from socio-economic survey findings that all the seven affected communities of proposed project have been neglected by government for quite some time in terms of provision of social amenities. All the communities' stakeholders are of the opinion that Presco proposed Sakponba oil palm and rubber development will bring good omen to them in terms of infrastructural development.

Potential negative impacts

The potential negative impacts envisaged by community stakeholders include:

- Loss of farmlands, community conservation and forest products collection areas
- Impacts on food prices and food security
- Influx of plantation workers and potential impacts on family structures and social new and negative values
- Water pollution due to agro-chemicals, sewage from worker's camps and POME
- Pollution from hazardous substances
- Impacts of heavy vehicles and construction activities
- Noise pollution from mill and plantations machineries
- Exposure to health risks (e.g. HIV)
- Adulteration/loss of indigenous cultural values leading to increase in crime
- Impacts on public facilities (e.g. public structures)
- Impacts of operations on infrastructure (roads, water)
- Potential conflicts with farmers whose farmlands have been taken over and no proper resettlement plan designed for them.
- **Potential social conflicts:** the entry of Presco Plc into these various communities will raise different interests among various interests group in the communities. For example, when the company provides some forms of monetary benefits as royalty for the community some group leaders who are not honest or transparent can hijack the entire process to favour only

themselves. If not properly managed it can lead to chaos and anarchy. This can be revealed in the process of demand for employments etc. within and among various communities. Some communities can express sentiments on not having same quota with other communities in terms of job and other benefits.

- **Cultural mix of values:** this is another form of social conflict. Since people from different backgrounds and all walks of life will come to the communities to work they will definitely mix with other members of the community. The process of blending and integration will result to certain influences, which if not properly managed will affect the overall cultural values of the various communities.

Issues raised by stakeholders and assessors comments

Name of stakeholder	Date of consultation	Major comments/concerns raised	Assessors response
Mrs R. O. Irefo, Head of Local Government Administration, Orhionmwon Local Government Area	9 th Dec 2016	No major concern except to express concerns that Presco has not engaged the Local Government sufficiently in the acquisition of the land and subsequent engagement with the communities and local population. She also advised that Presco should ensure the acquired land is properly surveyed and pillared to avoid encroachment which could bring conflict. On the Delta and Edo state boundary dispute, Mrs Irefo intimated that the National Land Boundary Commission and the Boundary Dispute Commission are addressing this at the national level but was also quick to explain that this dispute will not have any effect on Sakponba which lies to the north of the Ethiope River	The assessment team explained that the land has been surveyed and pillaring of boundaries is currently ongoing. The team also informed her that the Local Government's concern on weak engagement by Presco will be communicated to the management of Presco. The concerns have since been communicated to Presco.
Mr. V. O. Igbinigie, Director of Administration, Orhionmwon Local Government Area	9 th Dec 2016	No major concern except to advise that Presco should ensure all those who deserve compensations are duly compensated. He also advised that the company should ensure the project benefits the communities and the local peoples by way of offering employment and contribution to local development. Requested information on RSPO.	The team thanked him for the advice and explained that compensation process is being handled by the Ministry of Agric as required by law. Information on RSPO including the website were provided. His advice on compensation was communicated to the management of Presco.
Dr Godwin Ojo, Director of Environmental Rights Action (FOE-Nigeria)	13 th Dec 2016	The ERA team did not have any major comments for this specific project except to explain that they are generally concern and are against land grabbing by plantation companies in Nigeria. They	No major response.

and 8 of ERA staff		also explain that they are aware that Presco is not one of those companies replacing forests with oil palm but the organisation is yet to ascertain this through its own research on Presco.	
Mr M. I. Anogie (Director of Agric) & Mr Omorogie A. R. (Assistant Director), Min of Agriculture	1 st Dec 2016	The two directors explained that the Ministry of Agric is carrying out census of crops and other properties which will form the basis of valuation of farms and properties for the payment of compensations. The Ministry of Lands is the statutory body mandated by the Lands Use Act to determine compensation rates for different crops. They explained that the policy is that compensation payments are made immediately after evaluation and that they would like to advise Presco to respect this important requirement.	The assessment team thanked them for the information and informed them that the company is in the process completing payment of compensations for areas earmarked for conversion and for oil palm development in 2017.
Mrs Igbinigie Lygie (Acting Director of Lands)	1 st Dec 2016	No major comment except to explain that under the Lands Use Act of 1978, all lands in the state are vested in the State Governor who has the right to appropriate lands in the state. She explained that Presco has secured title over the land and that Presco is known to be a responsible company at the Lands Commission because the company complies with all statutory laws. Wanted to learn more about RSPO. She explained that the National Land Boundary Commission is working to address the state boundary dispute between Edo and Delta States	No major response except to thank her for the information provided. Information on RSPO was provided including the website.
Mr Friday Oriakhi (Director of Forestry) Min. of Environment and Public Utilities		The director did not raise any major concern except to explain that, by the state laws, Presco was expected to pay for all economic trees on the land prior to development, a requirement which the company has complied with. No major concern since the company has paid for the economic trees and have met all statutory requirements.	No major response.

Issues raised during communities' consultations and assessors comments

Community/stakeholder	No. of person attended	Discussion on potential HCVs, concerns and questions	Assessors response
Obagie community	59	The people indicated that they are happy with Presco using the land for oil palm development but were quick to explain that the Obagie community has taken Presco to court regarding execution of the terms of a MoU that the community signed with Presco in October 2015. The community members concern was that while the MoU indicates that Presco will only develop 10,000 ha of the 14,436 ha concession, leaving the remaining 4,436 ha for communal use, they claimed to have heard that Presco does not want to honour this but rather intends to use 12,000 ha of the land for oil palm. They were unhappy of the development and had thus taken the case to court. Also, some community members whose farms are in the concession have explained that their crops had been marked under the on-going compensation programme led by the Ministry of Agriculture on behalf of Presco, but had not yet received payment for their crops.	The assessment team responded that the issue with the MoU would be taken up with Presco. Upon checking with Presco, the company indicated that they are committed to respecting the MoU and that the company will develop 10,000 ha out of the 14,436 ha acquired concession while they continue with FPIC process to agree on the exact area that should be set-aside as future farmlands. With regards to the ongoing compensation program, it was explained to the community that some farms had been enumerated but their owners were yet to be identified and that these farmers were likely to be among the unidentified ones, yet to be paid.
Obanakhoro	68	The main concerns raised are that the forest patches in the concession particularly the one along Nyanchia stream host several NTFPs, including monkeys, snails, tortoise, antelopes, and spices and that they expect that Presco does not convert those areas. Also they were concerned that the Nyanchia stream which is a source of fish to them could be polluted or destroyed by the oil palm plantation activities.	The assessment team explained that all those riparian vegetation would be set-aside and protected and that was main reason the assessment was being carried out. They were also informed that recommendations for appropriate buffering of all rivers including the Nyanchia will be provided to Presco to adopt and implement.
Orogho	21	The Orogho community concerns was that there are forest patches known as Ekukusu where community members usually go to collect medicinal plants as well as hunt for game. The community said there was an historical site known as Egbon-Ogiougo. It is believed that some trees there grew from the beads of their war-hero of the same	The assessment team response was that a recommendation would be made to Presco to exclude all those areas they mentioned from conversion activities. They were also asked to nominate community representatives for mapping of

		<p>name during the war of Benin. They said that traditional rites are performed at the site whenever the Oba of Benin visits. William Osagie camp was mentioned as a historical site within the boundaries of the concession under this assessment. This was said to have served as a camping location for soldiers, as well as a hideout for prominent persons during the second World War II and that they wanted all those places to be excluded from conversion activities. They also raised concerns on whether Presco would not prevent the people from using the main road which goes through the concession.</p>	<p>those areas which they did and mapping was completed after three days of the community meeting. However, some of the areas mentioned such as William Osagie site (in the buffer zone of Ethiope River) and Egbon-Ogiougo (in the grassland area north of the concession) were found to be located outside of the concession.</p>
Owuo	47	<p>The Owuo community indicated that they are happy with Presco establishing oil palm plantations and mill in the area and indicated that the company has already been supportive in grading of communal roads. However, they raised a concern that the process of land acquisition did not take into account the consent of the entire community.</p>	<p>The assessment team response to the issue on land acquisition and consent was that Presco is in the process of finalising its FPIC process with all the fringe communities and that this will be completed prior to land preparation.</p>
Ekigbe/ Igbigun Communities	8	<p>The elders of this community explained that they have raised a concern with Presco and that they wanted the company to address the issue before any engagement with Presco representative. They were unwilling to disclose the issue to the team.</p>	<p>No major response except to explain that their message for Presco to address their concerns will be communicated to the management of Presco</p>
Iwevbo	12	<p>The Iwevbo community said they were aware that some portions of land within the concession had already been acquired by oil companies. They therefore wanted to know how Presco's presence would affect their engagement with these oil companies. However, checks with Lands Commission suggest that no oil company has acquired any part of the land.</p>	<p>The assessment team's response was that Presco's interest is to develop oil palm and that this does not prevent the community to engage with the oil company who may also drill oil from the land.</p>

List of legal documents, regulatory permits and property deeds related to the areas assessed

List of legal documents

The following laws and regulations apply to the proposed Sakponba oil palm and rubber plantation development project: (i) National Policy on Environment (FEPA, 1989); (ii) Environmental Impact Assessment Act 86, 1992; (iii) National Guidelines and Standards for Environmental Pollution Control in Nigeria, (FEPA,1991); (iv) National Effluent Limitations Regulations S.I.8 (FEPA,1991); (v) National Pollution Abatement in Industries and Facilities Generating Wastes Regulations S.I.9 (FEPA,1991); (vi) Waste Management and Hazardous Waste Regulations S.I.15 (FEPA,1991); (vii) Environmental Edicts of Edo States' Ministry of Environment and Public Utilities; (viii) Edo State Environmental Waste Management Board Edicts/Mandate; (ix) Local Government Area Mandate on environmental sanitation and solid waste management; (x) Factory Act 1990 (2004); (xi) Nigerian Land Use Act, 1978; (xii) The Nigerian Urban and Regional Planning Laws.

National Legislation

The National legislation applicable to this project includes:

- Environmental Impact Assessment Act, No. 86, 1992
- The National Policy On Environment, 1989
- National Guidelines & Standards for Environmental Pollution Control in Nigeria, 1991
- Harmful waste (criminal provision) Act 42 of 1988
- National Effluent Limitations Regulations S.I.8, 1991
- National Pollution Abatement in Industries & Facilities Generating Wastes Regulations S.I.9, 1991
- National Guidelines for Environmental Audit in Nigeria, 1999
- National Guidelines on Environmental Management System in Nigeria 1999.
- National Environmental Standards and Regulations Enforcement Agency (NESREA), 2007.
- Hazardous and solid waste management Regulations S.1.9., 1991
- Waste Management and Hazardous Waste Regulations S.I.15, 1991
- Factory Act CAP. F1 L.F.N. 2004
- Nigerian Land Use Act, 1978
- The Nigerian Urban and Regional Planning Law

3.2 HCV assessment summary findings

National/regional context

Nigeria is a diverse country with many different natural habitats, including savannas, tropical forests, wetlands, lakes, rivers and coastal areas. This diversity, coupled with diversity in landscapes and climatic conditions results in a corresponding diversity in the plants and animals. According to the National Biodiversity Strategy Report (2010), there are about 5,000 species of plants, 22,090 species of animals including insects and 889 species of birds. The report further indicates the presence of over 135 reptilian species, 109 amphibian species, and 648 fish species with the forests of Cross River State being considered as a hotspot for amphibian biodiversity. Threats to biodiversity and tropical forests in Nigeria result primarily from habitat degradation and unsustainable use, with the FAO reporting in 2005 that Nigeria had the highest deforestation rate in the world (FAO, 2005).

Subsequently, there are no intact forest outside of protected areas. There are five types of protected area in Nigeria (Kalu and Izeke, 2006). These are the Forest Reserves, National Parks, Biosphere and Strict Nature Reserves, Game Reserves and Special Ecosystems and Habitats. The network of protected areas in Nigeria include the famous Cross River National Park (400,000 ha) in the Cross River State and the Okomu National (20,000 ha) located in Okomu Forest Reserve in the Edo State. The Cross River National Park has one of the oldest rainforests in Africa, and has been identified as a biodiversity hot spot. Sixteen primate species have been recorded in the park including rare primates such as the common chimpanzees, drills and Cross River gorillas. The Okomu National Park is known to contain a viable population of several rare, threatened and endangered species including the

African most threatened primates and one of the two monkeys endemic to Nigeria, the Nigerian White-throated monkey. Notwithstanding the conservation importance of the remaining forests of Nigeria, there is increasing oil palm expansion which requires balancing development against conservation of natural areas. The landscape which contains the Sakponba concession has undergone several decades of agricultural development and thus heavily modified.

Scope

The scope of this HCV assessment is to conduct HCV assessment in the 14,436 ha Presco Sakponba concession. The purpose of the assessment which was carried out within the context of the RSPO certification, is to undertake a comprehensive and participatory assessment of HCVs, with a view to identifying any area(s) required to maintain or enhance one or more of the six categories of HCVs and to identify local people's land that may be located within the concession.

Demographic and socio-economic context

The total population of the 7 affected communities is 10,170 persons. This is made of 4,250 males and 5,920 females.

Livelihood and income:

The traditional occupations of the people in all the affected communities are subsistence farming, agro-based trading, fishing and agro processing (cassava & palm oil operators) in order of dominance. These traditional occupations are practiced alongside other economic activities such as transportation business (motorcyclists), civil service and artisans. All the communities complained of land pressure as a result of acquisition of their farmland for the proposed Sakponba estate. There are also few job opportunities from the civil service while few people are engaged as artisans and in transportation business. There are various forms of social capital available to households in the community notably family support, exchange of labour, group activities, and association and cooperative groups. The main sources of income of households and individuals are from occupations/activities like farming, trading and rendering of various services. Generally, there is poor income security in virtually all the affected communities

Education:

There are three (3) public primary schools and two (2) secondary schools in all the assessed communities. There is no marked discrimination in access to education gender wise although the only few primary schools and two secondary schools in the affected communities have positive correlation with the school enrolment rate. The informal education facilities and the adult learning programmes are non-existent in all the communities. There is acute shortage of teachers in all schools being more acute in the secondary school. For instance Obanakhoro Primary School built in 1946 has 169 pupils and 5 teachers including the headmaster. While Obanakhoro Secondary School built in 1980 is now non-functioning due to lack of teachers.

Religion:

Christianity tends to dominate in most of the communities assessed with average of 72.5% of Christians and cumulative number of churches of 20, and this is followed by traditional religion with cumulative number of 19 shrines while the Muslim population is at best negligible or none. Despite this difference in belief, there is harmony and balance in all the communities.

Health:

There are two health centres in all the affected communities but that of Orogho health centre was abandoned since 2014 by Edo State government therefore, forcing the community to use a makeshift clinic pending the completion of the health centre. The only functional health centre in Obanakhoro

lacks nurses, doctors and drugs. Adults and youths perception of the most common health related problems were malaria, typhoid fever, and cough. Key Informants; (Pastor Blessed Nosa Atoe-CDC chairman, Orogho and Edudu Lucky-Secretary, Ekigbe) confirmed the views and perception on health related problems as enumerated by youths and adults and were forthcoming with additional information such as waist pain, catarrh, arthritis, chest pains, and peoples' belief in spiritual forces.

Cultural implications:

The communities surveyed have similar culture in the way of greetings, marriage, tradition and other norms and values due to age long interaction dating back many years. The predominant languages among them are Benin and Urhobo. Almost all the six communities claim they have shrines and some sacred forests at the proposed project land. The locations of the shrines were only shown by pointing in their directions. They also claimed that strangers could not visit some of the shrines

Land ownership and use rights

Land was generally traditionally owned in Nigeria until 1978 when the government introduced the Land Use Decree and a Land Use Act under the Military and Civilian governments of 1978. Thus, all lands in Nigeria are now governed by the Nigerian Land Use Act of 1978 which vests all land compromised in the territory of each State (except land vested in the Federal government or its agencies) solely in the Governor of the State, who holds such land in trust for the people and would henceforth be responsible for allocation of land in all urban areas to individual residents in the State and to organisations for residential, agriculture, commercial and other purposes. Similar powers with respect to non-urban lands is conferred on Local Governments. Thus, the State Governor and the Local Government administer lands in accordance with the Land Use Act. However, the Land Use Act also recognises traditional or customary ownership systems and therefore expects that investors looking for land in Nigeria recognises and must first seek the right to use the proposed land prior to title registration. This allows traditional authorities to accept or reject investors within their jurisdiction. The Sakponba concession land falls within traditional land ownership category and was acquired by Presco Plc through a Deed of Assignment from His Royal Majesty OMO N' OBA N' EDO UKU AKPOLOKPOLO, OBA EREDIAUWA, CFR (The Oba of Benin) on 19th December 2011. The Oba of Benin (The Assignor) acquired the said land for farming purposes for a 99-year lease period through Customary Right of Occupancy (CRO) granted to him by the Orhionmwon Local Government Council of the Edo State on 14th September 1990. Presco acquired use right for the unexpired lease period of the 99-year lease which commenced in September 1990. In order to complete and to secure full title for this piece, Presco has gone ahead to acquire Certificate of Occupancy with number, EDSR17448 for the 14,436.823 ha. This Certificate of Occupancy was issued on 11th June 2013 for agricultural purposes by the Governor of the Edo State of Nigeria.

Protected areas: In general, Nigeria's biodiversity is declining rapidly in the face of its burgeoning human population (70% of which reside in the rural areas) and effective enforcement of forest reserves and conservation areas is lacking. Much of Nigeria's important wildlife and forest resources are in protected areas, but there is the concern that protected areas in Nigeria lack real protection. Edo State has a total land area of 1.9 million ha of which about 30% were designated as protected areas which are in 48 Forest Reserves which were constitution in the 1930s. However, excessive logging and anthropogenic activities notably farming have led to degradation of most of these forest reserves. The only forest reserves in the landscape are the Sakponba and Urhonigbe Forest Reserve 1 and 2 (Figure 4 and 5). However, both forest reserves have been so badly degraded that most parts have been de-reserved and are now farmlands. The southern part of the original UFR (now de-reserved according state officials consulted) shares boundaries with the northern part of the concession. The UFR was constituted in the early 1920s and has a total land area of 30,791 ha. The increasing pressure on the UFR including encroachment for farming due to the high density of settlement with the associated high population has contributed in replacing the original rainforest

vegetation of the UFR with fire-climax and grassland vegetation. The remaining part of the UFR is the 306 ha forest re-growth contained within Permanent Sample Plot 82 (PSP 82) and Strict Nature Reserve 3 (SNR 3) established by Forest Research Institute of Nigeria in 1954 and 1956 respectively. The PSP 82 is 6 ha with a protective buffer of 1,433 ha while SNR 3 is 300 ha with a buffer of 1,514 ha and characterized by trees carrying damaged/ill formed boles and/or crowns.

Land cover

The concession landscape is highly modified consisting of extensive grassland. The rest of the area is characterized by farmlands, oil palm farms and bush fallows, with very limited patches of low to medium density forests and riparian forests. Based on the data collected, the landscape was classified into six land use classes: riparian forest, low to Medium density forests or shrubland, plantations, farmland, grassland and water bodies. The table below presents the area covers by each type of land cover.

Table 3: Size of land use types of Sakponba proposed concession

Land use classes	Total area covered (ha)	Proportion (%)
Farmland	3747.9	25.96
Grassland	6456.0	44.72
Low to Medium density forests or shrubland	2097.5	14.53
Plantations	1960.7	13.58
Riparian forest	95.0	0.66
Water bodies	79.0	0.55
Total	14,436	100.00

NB: The figures in the table come from the land cover classification of the satellite imagery retrieved from the EarthExplorer webpage of the United States Geological Survey (USGS).

Water bodies

The main water body in the landscape is the Ethiope River which demarcates Edo State from the Delta State. It flows about 1.7 km from the farthest section and about 100 metres from the closest section to the Sakponba concession. To the east of the concession is Ehinmwin stream which flows about 50 metres from the concession. The only water bodies that drain the Sakponba concession are the Nyanchia and a small unnamed stream both draining the concession in the north-west and joining the Ethiope River to the west of the concession.

HCVs identified and justification

Table 4: Summary of HCV assessment findings

HCV	Definition	Present	Potentially present	Absent
1	Species diversity. Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels.			
2	Landscape-level ecosystems and mosaics. Intact Forest Landscape (IFL) and 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.			

3	Ecosystems and habitats. Rare, threatened, or endangered ecosystems, habitats or refugia.	
4	Ecosystem services. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.	
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.	
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.	

HCV 1: Species diversity

Interpretation

HCV	Key question	Finding
HCV 1	Species diversity. Concentrations of biological diversity including endemic species, and rare, threatened or endangered (RTE) species that are significant at global, regional or national levels	PRESENT

Identification and justification

Two species *Cola nigerica* locally called Nigerian Cola Tree (CE) and the *Gossweilerodendron balsamiferum* (commonly called *Agba Tola*) (EN) are HCV 1 plant species encountered in the Sakponba concession. The HCV 1 species such as the *C. nigerica* is of high cultural and commercial value because of the use of its nuts for chewing (fasting) and ceremonial purposes. Consequently, although sometimes felled for fuelwood, this species is typically preserved in the farmlands and forest pockets, along with retention of undergrowth, which benefits other species such as liptenine butterfly species (Lycaenidae) (Forest, 1992). Other species of conservation concern are the *Entandrophragma utile* (commonly called mufumbi mahogany or African cedar) and *Nauclea diderrichii* (commonly called African peach) are both (VU), *Irvingia gabonensis* (commonly called Wild or Bush Mango) and *Milicia excelsa* (commonly called Obeche or Odum) (NT). *Baphia nitida* (Camwood) and *Uvariastrum eliotianum* were classified as Least Concern (LC). These species are very few in the concession and although not HCV 1 species by themselves, were found in the vegetation along the Nyanchia stream which has been recommended for set-aside for protection.

Eight of the fauna species encountered (White stork, Palm-nut vulture, Malachite kingfisher, African civet, Flat-headed cusimanse, Red river hog, Bush buck and Maxwell's duiker) are listed as either nationally Rare, Threatened or Endangered in the Nigerian CBD 4th National Report of 2010 submitted to the Convention of Biodiversity. However, all these species are listed as Least Concern in the IUCN Red List. Given that these species are nationally rare, threatened and endangered, they are considered as HCV 1 species.

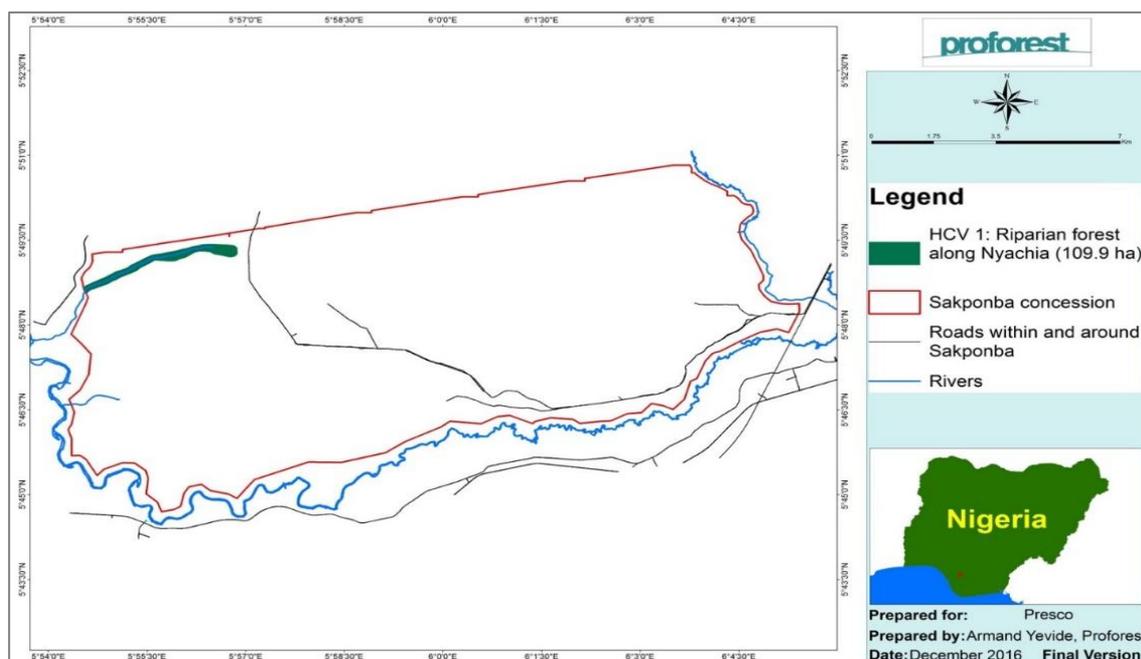


Figure 7: Map showing HCV 1 and their management areas

Most of the species listed as being of conservation importance are habitat generalists – capable of surviving in both mature forest and degraded and highly fragmented habitat, with none exclusively dependent on primary or mature forest cover. However, the assessment team concluded that HCV 1 is present in Sakponba based on the presence of two species of flora, *Cola nigerica* and *Gossweilerodendron balsamiferum* which are critically endangered and endangered respectively at the global level but are present in the degraded forest along the Nyanchia stream. Additionally, the nationally rare, threatened and endangered fauna species (White stork, African civet, Flat-headed cusimanse, Red river hog, Bush buck and Maxwell’s duiker) were also found in the Nyanchia riparian forest. All these species are considered HCV 1 based on their rarity at the global and national levels. The HCV 1 management forest area along Nyanchia stream is 109.9 ha. This includes the degraded forest habitats capable of natural regeneration to a good forest cover and a 10 m buffer between the forest and the proposed plantation. The extent of the HCV 1 set-aside area is 50 to 160 m from the stream and therefore exceeds the recommended 25 m buffer on either side of the stream even at the narrowest section of the HCV 1 forest along the river. The recommended HCV 1 management area is sufficient to maintain or enhance the 10 species (2 plants, 5 birds and 3 mammals) which are HCV 1 values because most of them are birds and plants. Besides, the remaining grassland vegetation is not their preferred habitat. However, the most important measure to maintain values is the protection of *Cola nigerica* and *Gossweilerodendron balsamiferum* from being felled/burnt and reduction/elimination of hunting pressure on mammalian species in the set-aside area.

HCV 2: Globally, regionally or nationally significant Intact Forest Landscapes (IFL) and large landscape level forest, landscape level ecosystem and ecosystem mosaics.

Interpretation

HCV	Key question	Finding
2	Does the concession contain or form part of a regionally or nationally significant Intact Forest Landscapes and large landscape forest or ecosystem, or does it serve as a linkage joining two such forests or ecosystems?	ABSENT

Identification and justification

As can be inferred from the land cover map above, the Sakponba concession is in a highly-fragmented mosaic of agricultural and other land uses. Large and intact natural ecosystems are extremely rare within the landscape. The nearby Urhonigbe Forest Reserve became badly degraded decades ago and has therefore been de-gazetted and converted into agricultural land of which a large part (areas bordering the Sakponba concession) has recently been converted into industrial cassava plantations. The Sakponba concession is not contained in or adjacent to intact landscapes that contain viable proportions of naturally occurring species in natural patterns and distribution. It is therefore unlikely that HCV 2 is present. The assessment therefore conclude that **HCV 2 is ABSENT**.

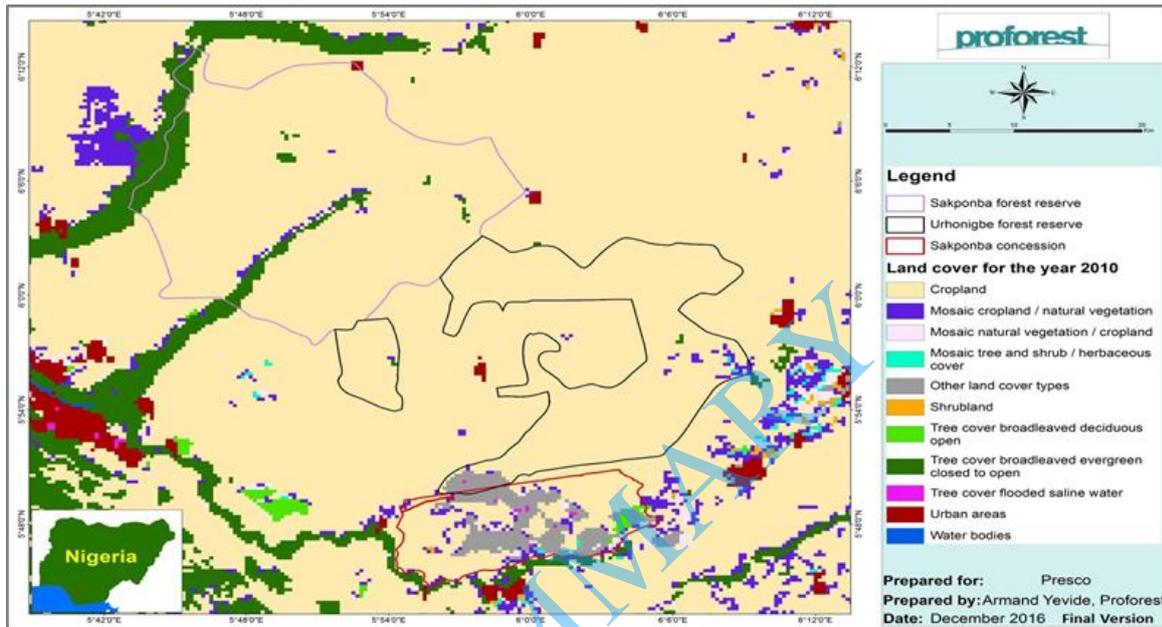


Figure 8: Land cover map of the Sakponba concession and the two forest reserves in the landscape

HCV 3: Areas that are in or contain rare, threatened and endangered ecosystems

Interpretation

HCV	Key Question	Finding
3	Does the concession fall within or contain an ecosystem or habitat that is considered rare, threatened or endangered?	PRESENT

Identification and justification

A few swamps and ponds are in the Sakponba concession. Swampland ecosystems are increasingly becoming rare at various scales due largely to drainage for agriculture and other purposes, and constitute a highly-threatened habitat type. The swamps are very small ranging from 0.4ha to about 3 ha but could be larger during the peak of the rainy season. They are mainly located in the savannah-like grassland with the major ones such as Ezenugbegbe being sacred sites or shrines for the fringe communities such as Obagie and Orogho. The swamps provide a refuge to a variety of wildlife species (mostly birds) as was evident from the results of the fauna survey carried out during this assessment although no HCV 1 bird species was encountered at the swamps. Given the high deforestation rates in the past and the increasing area under cultivation, lowland swamp forests with natural species composition are rare in the country. This means that any swamp area and the forest vegetation around it would almost certainly qualify as HCV because the ecosystem has become so

rare due to anthropogenic activities. Thus, all the small pockets of swamps and ponds in the concession have been identified as HCV 3 areas. A 30 metre buffer from the edge of the inundated area during peak wet season is recommended for the three small swamps and ponds in the concession. The HCV 3 swamps and ponds include the Ezenugbegbe and Iwevbo swamp areas and the Army Base pond (referred to as “Lake” by the local people) that are in the concession are considered HCV 3. The total area of HCV 3 in the concession are approximately **10.8 ha**.

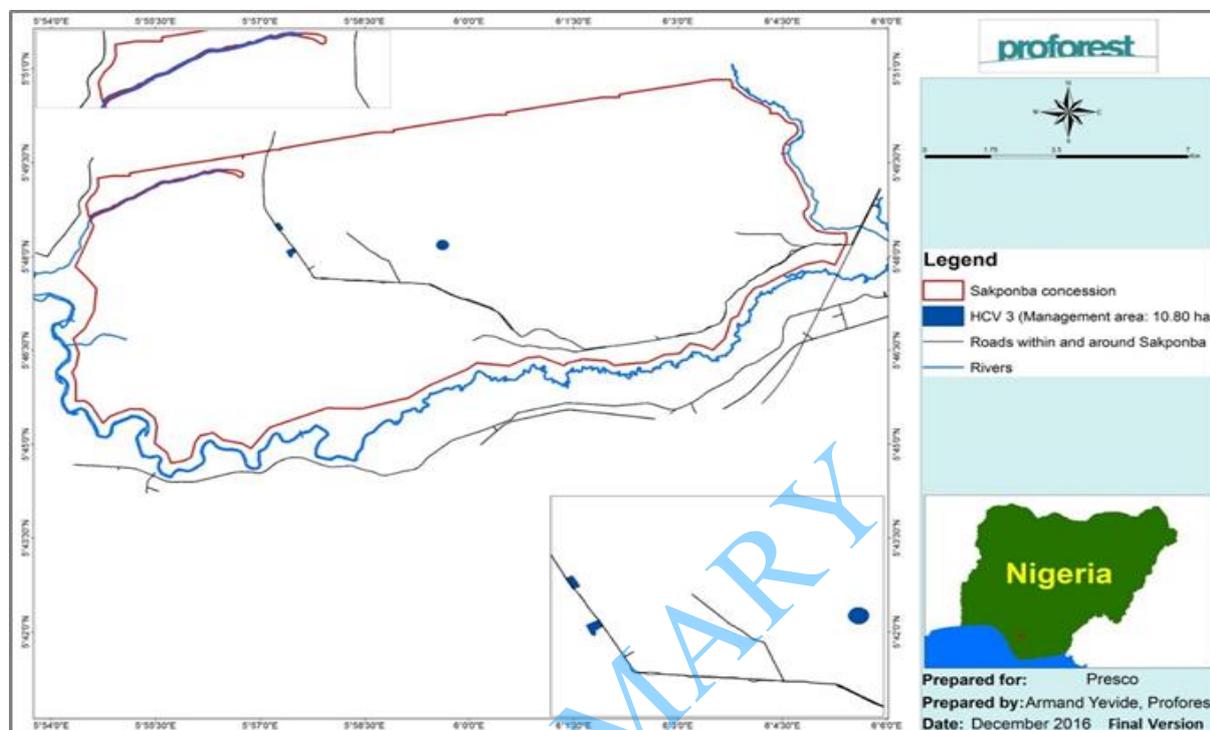


Figure 9: Map of Sakponba concession with HCV3 areas, the Ethiope River and its tributaries

HCV 4: Areas that provide basic services of nature in critical situations

Interpretation

HCV	Key question	Finding
	Ecosystem services. Basic ecosystem services in critical situations, including protection of water catchments and control of erosion of vulnerable soils and slopes.	PRESENT

Identification and justification

The concession is low-lying and there are no sign of erosion. Secondary, although parts of the grassland vegetation is burnt each year by the Fulani herdsmen to facilitate grass regrowth for cattle grazing, there is no known threat of wildfire in the landscape. Therefore on the basis of spread of wildfire and erosion, HCV 3 is not present. However, the streams draining the concession and their riparian vegetation play important role in supporting and regulating ecosystem services including flood regulation/buffering and water purification. Additionally, the people of Obanakhoro intimated during the communities’ consultations that the Nyanchia stream is a source of drinking water whiles on their farms. They also explain that the Nyanchia stream is a major source of protein during the dry season because according to them, the stream produces large quantities of fish during the dry season which the people of the community collect. No other river exists in the concession apart from the

swamps and ponds which have been identified as HCV 3. Therefore Nyanchia and the small stream are considered HCV 4. The forest vegetation along Nyanchia stream is about 50 metres at the narrowest section and 160 metres at its widest section. The recommended HCV 3 management area is 25 metres on either side of the stream and this is within the existing riparian buffer. Nigeria does not have a Buffer Zone Policy that have recommendations and set limits for buffer zones. Therefore the 25 metres buffer recommended buffer for the Nyanchia stream was based on the Buffer Zone Policy for Ghana which has buffer zone recommendations based on the width of the river, the topography and the landuse. The recommended buffer for the small unnamed stream below Nyanchia is 25 metres on either side of the river. This is also based on buffer zone recommendations from the Ghana Buffer Zone Policy.

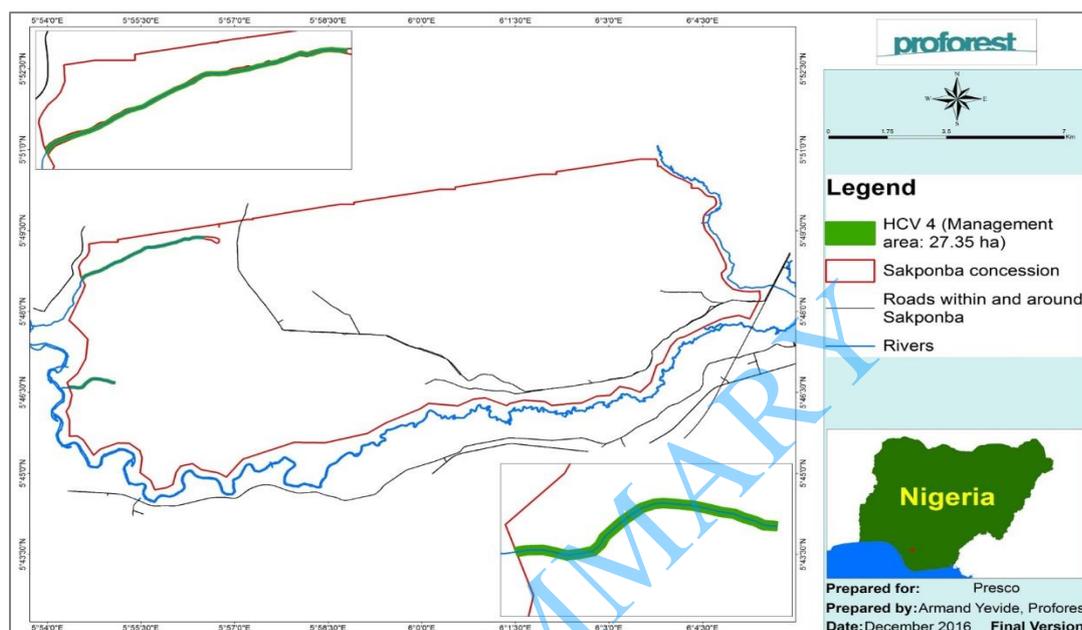


Figure 10: Map of the concession with HCV4 areas along Nyanchia and a small stream (both tributaries of the Ethiope River)

Based on the above, HCV 4 is confirmed **PRESENT**. Given the presence of the very few perennial swamps, several seasonal ponds, and the only two riparian forests that serve as waterbodies on which local communities depend for household consumption, the **Nyanchia stream and its riparian forest and the riparian forest of the unnamed small stream are considered as HCV 4**. Total HCV 4 management areas which comprises 25 m on either side of both streams is 27.35 ha. Please note that the recommended buffer of 25 m is less than the width of riparian forest along the Nyanchia stream. The recommended buffer for the unnamed stream is also slightly higher the width of the riparian forest although some areas contain farms. Therefore, the assessment team have made recommendations for rehabilitation of riparian buffer of the small unnamed stream.

HCV 5: Areas fundamental to meeting basic needs of communities

Interpretation

HCV	Key question	Finding
5	Does the concession contain areas that are fundamental to meeting the basic necessities of the local communities, e.g. (livelihood, nutrition, water, health etc)?	PRESENT

Identification and justification

Although NTFPs are diffused in the landscape and the local population do collect them from everywhere in the landscape, the people of Obanakhoro explained during the community consultations that the population of the community collect fish from the Nyanchia stream to supplement household protein. They do this during the dry season when the stream dries up. They also do collect NTFP from the forest vegetation along the stream although they explained that this is not the only and the most important place for NTFP collection. There are other small pockets of vegetation areas that the people of Orogho and Obagie collect NTFPs. These are the Ezenuwor and the Ekukusu areas. Most NTFP collection sites including the famous Ezenuwor area are located outside of the concession. However, given the myriad of livelihood services provided by the Nyanchia stream including as a source of drinking water and collection of NTFPs in the riparian forest along the river, the assessment team concluded that the Nyanchia stream and its associated buffer and the small Ekukusu in the concession are HCV 5 and therefore HCV 5 is confirmed **PRESENT** (Figure 16). Total management area of these two HCV 5 areas (Nyanchia 109.9 ha and Ekukusu 1.84 ha) is approximately **111.74 ha**. The 109.9 ha of the HCV management area along Nyanchia also overlap with HCVs 4 and 6 given that Nyanchia shrine is located within the buffer zone of the Nyanchia stream.

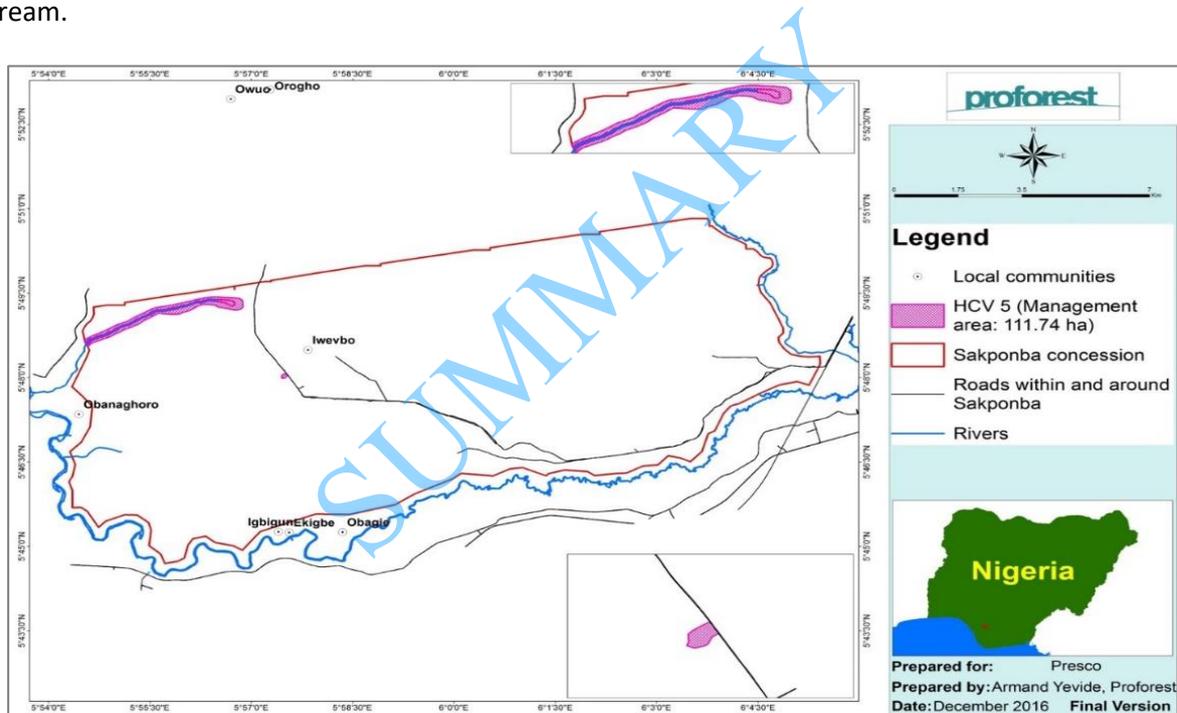


Figure 11: Map of Sakponba concession and the location of HCV5 areas around the Nyanchia Stream

HCV 6: Areas critical to local communities' traditional cultural identity

Interpretation

HCV	Key question	Finding
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.	Present

Identification and justification

All the communities surveyed indicated that they have shrines or sacred sites located within the concession or closed to the community, except Obanakhoro which indicated that the community is Christian community and therefore does not have a shrine. Four of the six sacred sites identified (Ezenugbegbe, Arousa, Nyanchia and Egon-gougou) are in the concession while the Ezenubie and Izabouwen are located outside of the concession.

Ezenugbegbe: This is believed to be located in a deep pond. The annual ritual is performed in December of each year and the specific date is announced by the Oba of Benin. They believe that the pond provides abundant fish for them in July of every year. The local people indicated that the shrines and its required management area should be **2.9 ha**.

Nyanchia: This is a shrine where the founder of the Obagie community first settled to bless the establishment of the community. Although most of the headwaters of the Nyanchia stream is considered a shrine, the actual HCV 6 and its management area agreed with the local population is **0.21 ha**.

Arousa: This shrine is serviced in October of each year and it is this believed that the people of the area can only eat the new yam after the performance of the rituals in October. The Arousa shrine and its management area agreed with the local population is **0.4 ha**.

Egbon-ogiougo: The people believe that during the Benin people on one hand and one Benin Chief, called Ogiougo, the Ogiougio dropped his bead at the site and it germinated to become a tree. The shrine and its management area agreed with local communities is **4 ha**.

HCV6 is thus confirmed **PRESENT** (total HCV areas is **7.51 ha**).

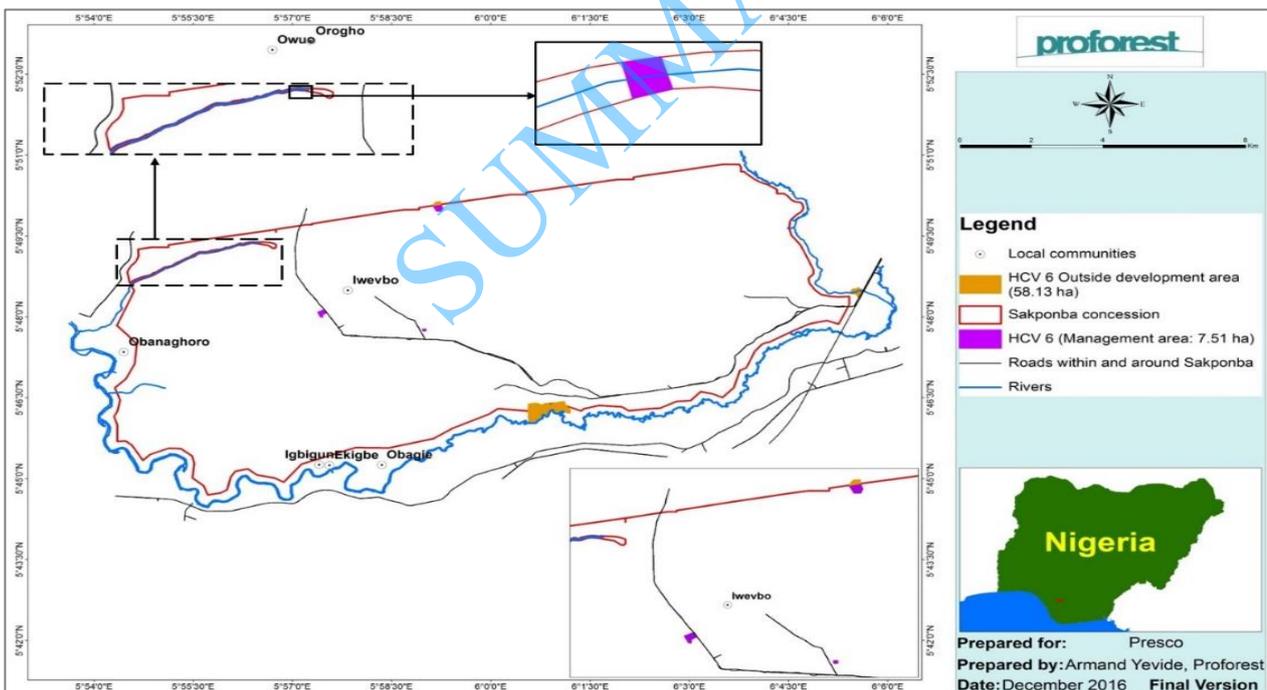


Figure 12: Map showing HCV 6 areas in the Sakponba concession. Total area 7.51 ha

Stakeholder consultations

Table 5: Outcome of stakeholder consultations

Name of stakeholder	Date of consultation	Major comments/concerns raised	Assessors response
Mrs R. O. Irefo, Head of Local Government Administration, Orhionmwon Local Government Area	9 th Dec 2016	No major concern except to express concerns that Presco has not engaged the Local Government sufficiently in the acquisition of the land and subsequent engagement with the communities and local population. She also advised that Presco should ensure the acquired land is properly surveyed and pillared to avoid encroachment which could bring conflict. On the Delta and Edo state boundary dispute, Mrs Irefo intimated that the National Land Boundary Commission and the Boundary Dispute Commission are addressing this at the national level but was also quick to explain that this dispute will not have any effect on Sakponba which lies to the north of the Ethiopian River	The assessment team explained that the land has been surveyed and pillaring of boundaries is currently ongoing. The team also informed her that the Local Government's concern on weak engagement by Presco will be communicated to the management of Presco. The concerns have since been communicated to Presco.
Mr. V. O. Igbinigie, Director of Administration, Orhionmwon Local Government Area	9 th Dec 2016	No major concern except to advise that Presco should ensure all those who deserve compensations are duly compensated. He also advised that the company should ensure the project benefits the communities and the local peoples by way of offering employment and contribution to local development. Requested information on RSPO.	The team thanked him for the advice and explained that compensation process is being handled by the Ministry of Agric as required by law. Information on RSPO including the website were provided. His advice on compensation was communicated to the management of Presco.
Dr Godwin Ojo, Director of Environmental Rights Action (FOE-Nigeria) and 8 of ERA staff	13 th Dec 2016	The ERA team did not have any major comments for this specific project except to explain that they are generally concerned and are against land grabbing by plantation companies in Nigeria. They also explain that they are aware that Presco is not one of those companies replacing forests with oil palm but the organisation is yet to ascertain this through its own research on Presco.	No major response.
Mr M. I. Anogie (Director of Agric) & Mr Omorie A. R. (Assistant	1 st Dec 2016	The two directors explained that the Ministry of Agric is carrying out census of crops and other properties which will form the basis of valuation of farms and properties for the payment of compensations. The Ministry of Lands is	The assessment team thanked them for the information and informed them that the company is in the process completing payment of compensations

Director), Min of Agriculture		the statutory body mandated by the Lands Use Act to determine compensation rates for different crops. They explained that the policy is that compensation payments are made immediately after evaluation and that they would like to advise Presco to respect this important requirement.	for areas earmarked for conversion and for oil palm development in 2017.
Mrs Igbinigie Lygie (Acting Director of Lands)	1 st Dec 2016	No major comment except to explain that under the Lands Use Act of 1978, all lands in the state are vested in the State Governor who has the right to appropriate lands in the state. She explained that Presco has secured title over the land and that Presco is known to be a responsible company at the Lands Commission because the company complies with all statutory laws. Wanted to learn more about RSPO. She explained that the National Land Boundary Commission is working to address the state boundary dispute between Edo and Delta States	No major response except to thank her for the information provided. Information on RSPO was provided including the website.
Mr Friday Oriakhi (Director of Forestry) Min. of Environment and Public Utilities		The director did not raise any major concern except to explain that, by the state laws, Presco was expected to pay for all economic trees on the land prior to development, a requirement which the company has complied with. No major concern with this project which is yet to start since the company has paid for the economic trees and have met all statutory requirements on land acquisition.	No major response.

Table 6: Outcome of community consultations

Community/ stakeholder	No. of person attended	Discussion on potential HCVs, concerns and questions	Assessors response
Obagie community	59	The people indicated that they are happy with Presco using the land for oil palm development but were quick to explain that the Obagie community has taken Presco to court regarding execution of the terms of a MoU that the community signed with Presco in October 2015. The community members concern was that while the MoU indicates that Presco will only develop 10,000 ha of the 14,436 ha concession, leaving the remaining 4,436 ha for communal use, they claimed to have	The assessment team responded that the issue with the MoU would be taken up with Presco. Upon checking with Presco, the company indicated that they are committed to respecting the MoU and that the company will develop 10,000 ha out of the 14,436 ha acquired concession while they continue with FPIC process to agree on the exact area that should be set-aside as future farmlands. With regards to the ongoing compensation program, it was explained to the community that some farms had

		heard that Presco does not want to honour this but rather intends to use 12,000 ha of the land for oil palm. They were unhappy of the development and had thus taken the case to court. Also, some community members whose farms are in the concession have explained that their crops had been marked under the on-going compensation programme led by the Ministry of Agriculture on behalf of Presco, but had not yet received payment for their crops.	been enumerated but their owners were yet to be identified and that these farmers were likely to be among the unidentified ones, yet to be paid.
Obanakhoro	68	The main concerns raised are that the forest patches in the concession particularly the one along Nyanchia stream host several NTFPs, including monkeys, snails, tortoise, antelopes, and spices and that they expect that Presco does not convert those areas. Also they were concerned that the Nyanchia stream which is a source of fish to them could be polluted or destroyed by the oil palm plantation activities.	The assessment team explained that all those riparian vegetation would be set-aside and protected and that was main reason the assessment was being carried out. They were also informed that recommendations for appropriate buffering of all rivers including the Nyanchia will be provided to Presco to adopt and implement.
Orogho	21	The Orogho community concerns was that there are forest patches known as Ekukusu where community members usually go to collect medicinal plants as well as hunt for game. The community said there was an historical site known as Egbon-Ogiougo. It is believed that some trees there grew from the beads of their war-hero of the same name during the war of Benin. They said that traditional rites are performed at the site whenever the Oba of Benin visits. William Osagie camp was mentioned as a historical site within the boundaries of the concession under this assessment. This was said to have served as a camping location for soldiers, as well as a hideout for prominent persons during the second World War II and that they wanted those places to be excluded from conversion activities.	The assessment team response was that a recommendation would be made to Presco to exclude all those areas they mentioned from conversion activities. They were also asked to nominate community representatives for mapping of those areas which they did and mapping was completed after three days of the community meeting. However, some of the areas mentioned such as William Osagie site (in the buffer zone of Ethiopie River) and Egbon-Ogiougo (in the grassland area north of the concession) were found to be located outside of the concession.
Owuo	47	The Owuo community indicated that they are happy with Presco establishing oil palm plantations and mill in the area and indicated that the company has already been supportive in grading of communal roads. However, they raised	The assessment team response to the issue on land acquisition and consent was that Presco is in the process of finalising its FPIC process with all the fringe communities and that this will be completed prior to land preparation.

		a concern that the process of land acquisition did not take into account the consent of the entire community.	
Ekigbe/ Igbigun Communities	8	The elders of this community explained that they have raised a concern with Presco and that they wanted the company to address the issue before any engagement with Presco representative. They were unwilling to disclose the issue to the team.	No major response except to explain that their message for Presco to address their concerns will be communicated to the management of Presco
Iwevbo	12	The Iwevbo community said they were aware that some portions of land within the concession had already been acquired by oil companies. They therefore wanted to know how Presco's presence would affect their engagement with these oil companies. However, checks with Lands Commission suggest that no oil company has acquired any part of the land.	The assessment team's response was that Presco's interest is to develop oil palm and that this does not prevent the community to engage with the oil company who may also drill oil from the land.

3.3 Soil and topography

Areas with marginal and fragile soils

There were no marginal or fragile soils identified within the concession proposed for oil palm development except the ponds and wetland areas which have been identified as HCV 3.

Identification of all areas of excessive gradients (>25°)

There were no areas of excessive gradients with slopes above 25° in the Sakponba concession.

3.4 Summary of Carbon Stock assessment and Greenhouse Gas emission

The Presco's Sakponba project will entail oil palm plantation development only. No new mill will be established, as it is expected that the FFB produced from the operation will be transferred to the existing processing facility at Obaretin which is roughly located at 41.25 kilometres north-west of the proposed Sakponba concession in the Edo State of Nigeria.

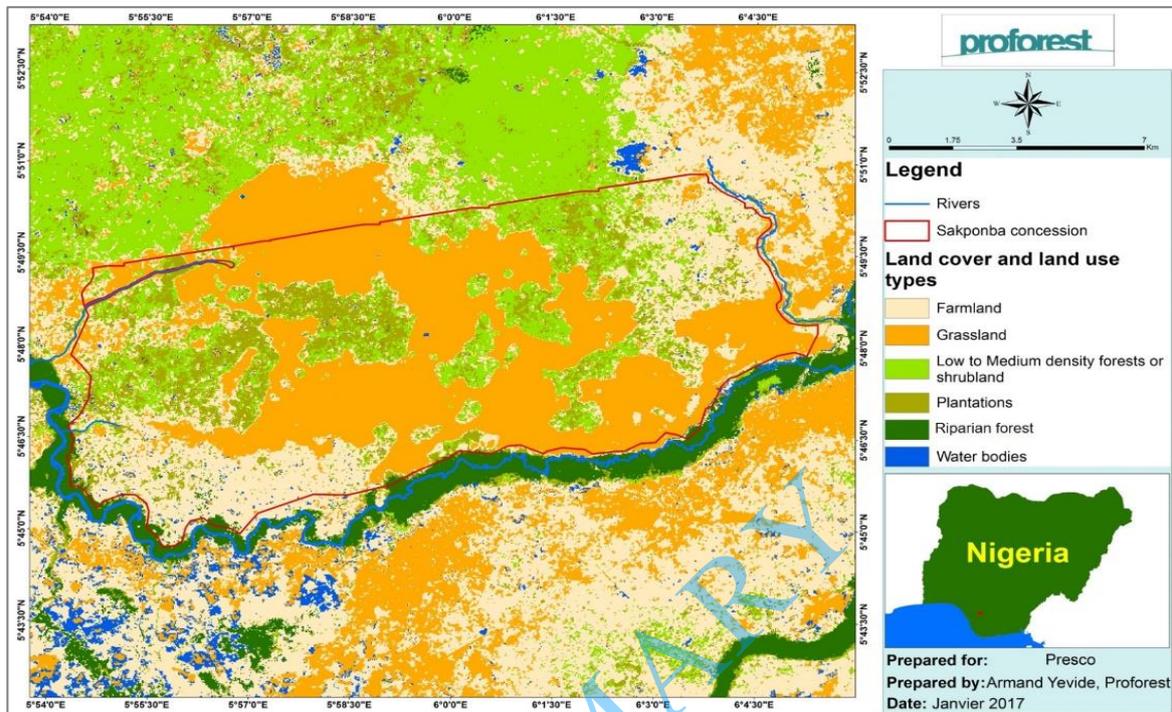
The most likely emission sources from this project would be the following:

- Emissions from landuse change
- Emissions associated with fertiliser use
- Emissions associated with FFB transport
- Emissions from Palm Oil Mill Effluent
- Emissions associated with fossil fuel and electricity

Land cover classification

Presco provided maps of its Sakponba concession in Edo State. In planning for the assessment, a combination of satellite images of the wider landscape was used. This included publicly available Google Earth imagery which were used in the initial planning for the assessment. Satellite imageries

were thereafter used to aid the assessment of the study area and to determine the land cover classes in the area. The Figure below presents the key outputs of the land cover classification. The satellite imageries were studied closely in order for the team to get a clearer picture of the nature of the vegetation cover, and to help inform sampling design.



NB: The land cover classification was based on a 30 metres resolution satellite image acquired from the EarthExplorer webpage of the United States Geological Survey (USGS) (<http://earthexplorer.usgs.gov/>) for the year 2016 (Scene Identifier: LC81890562016027LGN00 acquired on the 27th January 2016).

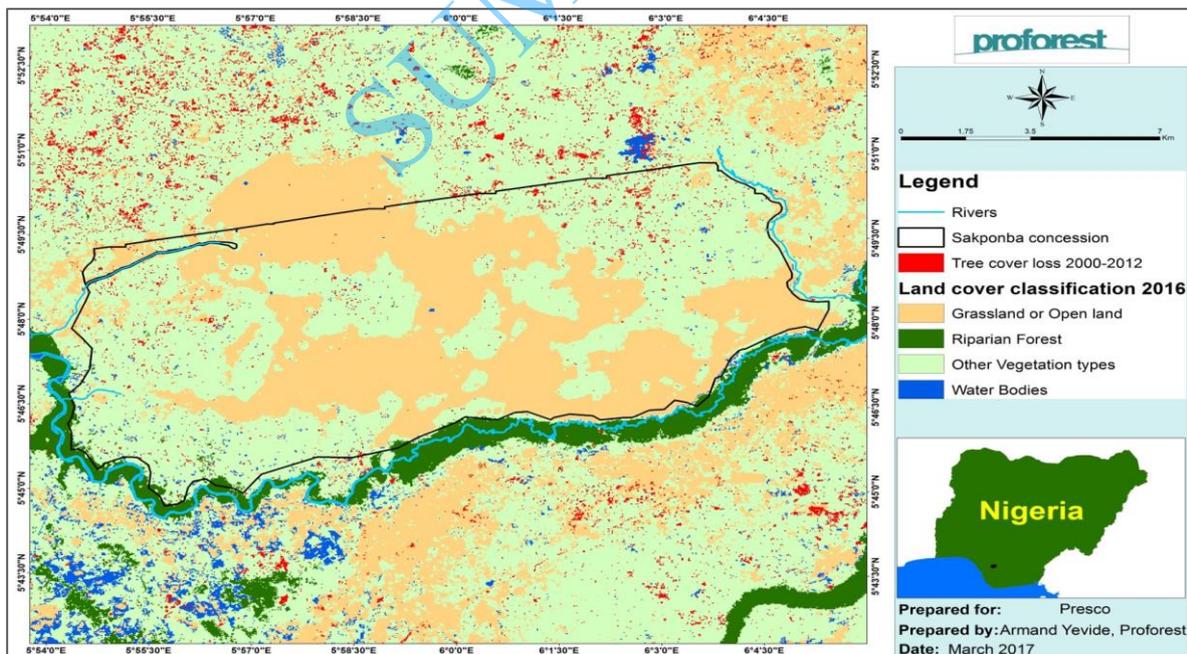


Figure 14: Land cover map showing tree cover gain and loss from 2000 to 2012

The tree cover loss map is taken from Hansen et al 2014 (http://earthenginepartners.appspot.com/science-2013-global-forest/download_v1.1.html).

Map and description of areas with significant carbon stocks including areas of peat soils

The proposed concession does not contain any primary forest. Its vegetation is dominated by grassland and farmland. Mean carbon stock is 1.32 tC/ha. This low carbon stock recorded can be attributed to the low density of trees (21.5 trees/ha) as well as the higher proportion of small trees and the vegetation types of the proposed concession's landscape.

Based on the proportion of each vegetation type in the concession, the total carbon stock of trees is 21,823.35 tons of carbon.

There were no areas in the Sakponba concession identified with significant carbon stock or peat soils.

Identification of areas of significant sources of GHG emissions and sequestration in the concession

A GHG analysis was conducted for the proposed Sakponba oil palm plantation development. The study summarizes recommendations of the High Conservation Value and High Stock assessments and presented four different scenarios. These scenarios are provided to guide final consultation with landowners and company executive management to mitigate the GHG impact of this particular development.

The following are the basic rules utilized to generate the scenarios:

1. All HCVs and their recommended management areas are earmarked for protection and conservation in addition to 1,522 ha for camp, infrastructures and other potential conservation.
2. All HCVs and their recommended management areas are earmarked for protection and conservation in addition to 1,415 ha for camp and infrastructures.
3. The use of conventional POME treatment method or the use methane capture method for POME treatment.
4. The use of biomethanisation which is methane capture method for POME treatment.

Table 7: Size of different land cover types at Sakponba concession

Land use classes	Total area covered (ha)	Proportion (%)
Farmland	3747.9	25.96
Grassland	6456.0	44.72
Low to Medium density forests or shrubland	2097.5	14.53
Plantations	1960.7	13.58
Riparian forest	95.0	0.66
Water bodies	79.0	0.55
Total	14,436	100.00

NB: The figures in the table come from the land cover classification of the satellite imagery retrieved from the EarthExplorer webpage of the United States Geological Survey (USGS).

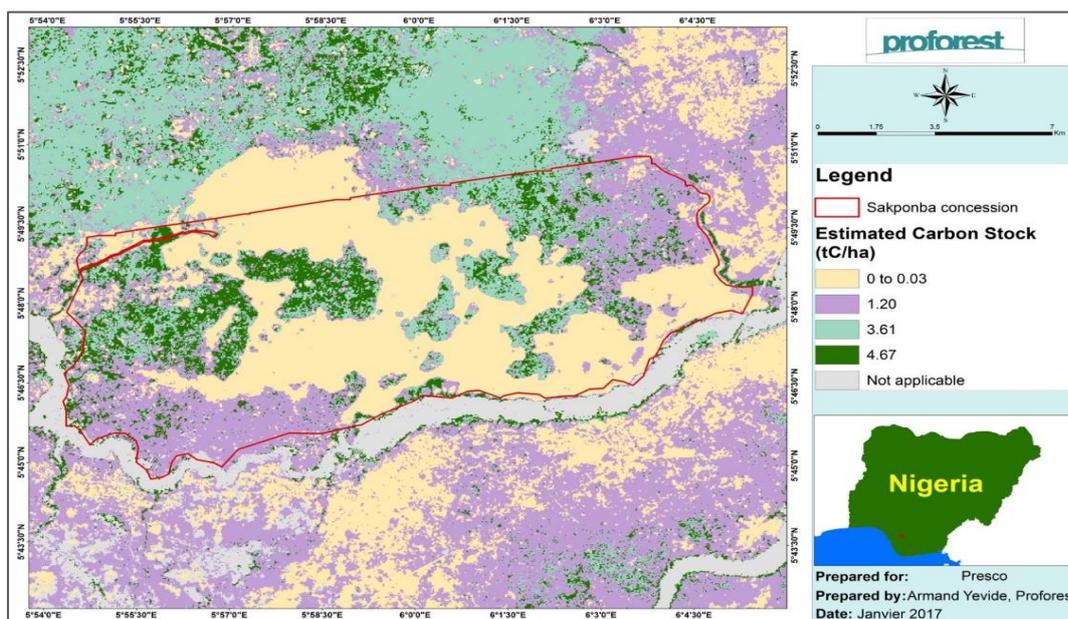


Figure 15: Distribution of carbon stock estimated for Sakponba proposed concession.

The figure 15 above shows the distribution of carbon stock across the Presco’s Sakponba proposed concession. The estimated carbon stock varies from 0.03 tC/ha for the grassland to 4.6 tC/ha for plantations which are *Hevea brasiliensis* dominated. The estimated carbon stock for the sampled plots was 153.91 tC and averaged 1.32 tC/ha. Extrapolated to the entire size of the proposed concession, the total carbon stock was 21,823.35 tC.

Table 8: Total carbon stock estimated in the different vegetation types in the concession

Vegetation types	Sampled area			Total concession	
	Sampled area (ha)	Total carbon (tC)	Carbon (tC/ha)	Total area (ha)	Total carbon (tC)
Farmland	13.04	15.63	1.20	3747.9	4497.48
Grassland	67.68	1.78	0.03	6456.0	193.68
Low to medium density forest	28.68	103.59	3.61	2097.5	7571.98
Plantation	7.04	32.91	4.67	1960.7	9156.47
Riparian forest	0.04	0.17	4.25	95.0	403.75
Water bodies	0	0	0.00	79.0	0.00
Total	116.48	154.08	1.32*	14436	21823.35

*This value is equal to the total carbon obtained for the sampled area (154.08 tC) divided by the total sampled area (116.48 ha).

Emission estimations (Scenario analysis)

Four scenarios were run using the New Development GHG Calculator provided by RSPO. The Table below and the figure below present the results of the analysis.

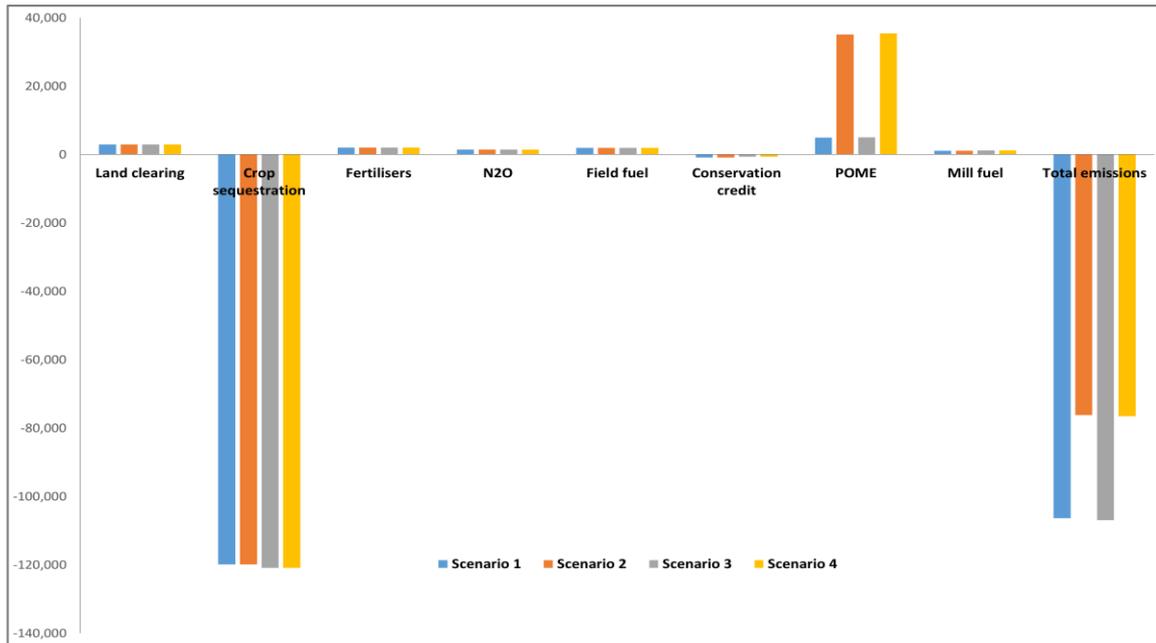


Figure 16: Expected emissions from proposed development

3.5 Land Use Change Scenario analysis

Results and discussions

Scenario 1

This first scenario is based on the recommendations of the HCV assessment (136 ha to be set aside as HCVs management areas) and the decision of the company to set aside an additional 1,522 ha for camps and other potential conservation areas such as additional buffer zones. Therefore, this scenario assumes that there is a set aside area of 1,658 ha and the remainder of the concession is planted. This scenario assumes also that the conventional POME treatment is used.

The analysis shows that with this scenario, there would be a net sequestration of 106,342 tCO₂e. This scenario assumes that the planted area will be able to sequester about 119,902 tCO₂e, whilst the land clearance would emit 2,976 tCO₂e. The conservation credit in this scenario is about 921 tCO₂e.

Scenario 2

This second scenario is based on the recommendations of the HCV assessment (136 ha to be set aside as HCVs management areas) and the decision of the company to set aside an additional 1,522 ha for camps and other potential conservation areas. Therefore, this scenario assumes that there is a set aside area of 1,657 ha and the remainder of the concession is planted. This scenario assumes also that the methane capture method for POME treatment is used.

The analysis shows that with this scenario, there would be a net sequestration of 76,188 tCO₂e. This scenario assumes that the planted area will be able to sequester about 119,902 tCO₂e, whilst the land clearance would emit 2,976 tCO₂e. The conservation credit in this scenario is about 921 tCO₂e.

Scenario 3

This third scenario is based on the recommendations of the HCV assessment (136 ha to be set aside as HCVs management areas) and the decision of the company to set aside an additional 1,415 ha for camps and other buffer zones. Therefore, this scenario assumes that there is a set aside area of 1,551 ha and the remainder of the concession is planted. This scenario assumes also that the conventional POME treatment is used.

The analysis shows that with this scenario, there would be a net sequestration of 106,934 tCO₂e. This scenario assumes that the planted area will be able to sequester about 120,905 tCO₂e, whilst the land clearance would emit 3,001 tCO₂e. The conservation credit in this scenario is about 631 tCO₂e.

Scenario 4

This fourth scenario is based on the recommendations of the HCV assessment (136 ha to be set aside as HCVs management areas) and the decision of the company to set aside an additional 1,415 ha for camps and other buffer zones. Therefore, this scenario assumes that there is a set aside area of 1,551 ha and the remainder of the concession is planted. This scenario assumes also that the methane capture method for POME treatment is used.

The analysis shows that with this scenario, there would be a net sequestration of 76,529 tCO₂e. This scenario assumes that the planted area will be able to sequester about 120,905 tCO₂e, whilst the land clearance would emit 3,001 tCO₂e. The conservation credit in this scenario is about 631 tCO₂e.

Table 9: Carbon emissions/sequestration under four different scenarios.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
	t CO ₂ e			
Land clearing	2,976	2,976	3,001	3,001
Crop sequestration	-119,902	-119,902	-120,905	-120,905
Fertilisers	2,002	2,002	2,019	2,019
N ₂ O	1,427	1,427	1,439	1,439
Field fuel	1,918	1,918	1,934	1,934
Peat	0	0	0	0
Conservation credit	-921	-921	-631	-631
POME	4,994	35,147	5,036	35,441
Mill fuel	1,164	1,164	1,173	1,173
Purchased electricity	0	0	0	0
Credit (excess electricity exported)	0	0	0	0
Credit (sale of biomass for power)	0	0	0	0
Field emissions & sinks	-112,499	-112,499	-113,143	-113,143
Mill emissions & credit	6,158	36,311	6,209	36,615
Total emissions (field and mill)	-106,342	-76,188	-106,934	-76,529

Results and discussions

Given that the proposed concession is dominated by grassland and farmland the sequestration potential of the vegetation at Sakponba is very low. The outputs of the scenarios analysis show that with the scenarios 1 and 2, there would be a net sequestration of 106,342 tCO₂e and 76,188 tCO₂e respectively. These scenarios assume that the planted area will be able to sequester about 119,902 tCO₂e, whilst the land clearance would emit 2,976 tCO₂e. For the scenarios 3 and 4 the net sequestration would be 106,934 tCO₂e and 76,529 tCO₂e respectively. The planted area will be able to sequester about 120,905 tCO₂e and the land clearance would emit 3,001 tCO₂e. The conservation credit in the scenarios 1 and 2 is greater than in scenarios 3 and 4. The scenario 1 has been chosen by Presco as it is almost equivalent to the scenario 3 but offers more conservation areas therefore more biodiversity.

It appears that, the oil palm development at Sakponba would contribute to sequester more carbon than the current vegetation. Kongsager *et al.* (2013) have conducted a study on the carbon sequestration potential of tree crop plantations including oil palm plantations in Ghana. They noticed that, there is a considerable carbon sequestration potential in plantations if the plantations are established on land with modest carbon content such as degraded forest or agricultural land, and not on land with old-growth forest. Their study demonstrated that oil palm plantations sequester about 45 tC/ha which is several times higher than the carbon sequestration potential of the current grassland and farmland dominated vegetation at Sakponba.

Carbon Stock and HCV

The Figures below are Carbon Stock and HCV maps of Presco Sakponba concession.

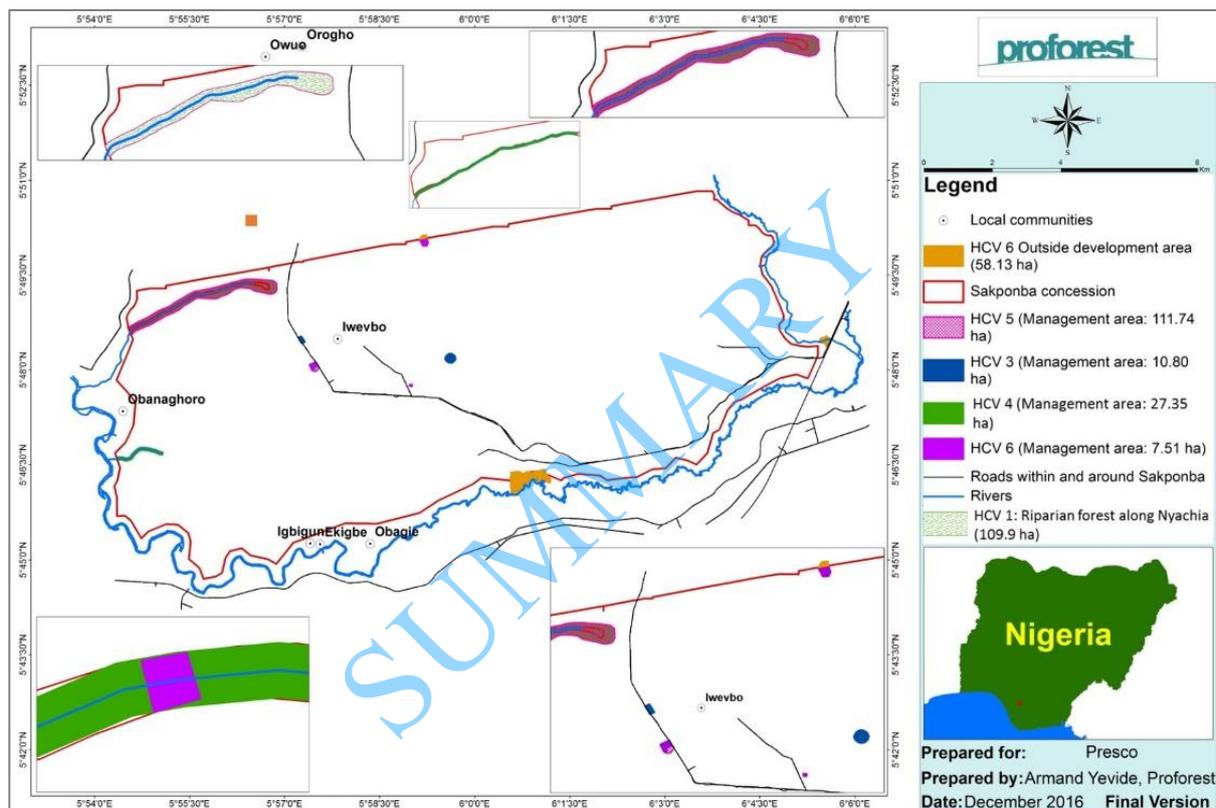


Figure 17: HCVs and HCVs management areas for Presco’s Sakponba proposed concession

Table 10: Table showing the size of the identified HCVs and the overlaps.

	HCV1	HCV3	HCV4	HCV5	HCV6
HCV1	109.9		19.84	109.9	0.21
HCV3		10.8			2.84
HCV4			27.35		
HCV5				111.74	
HCV6					7.51
136 ha	110	11	8	2	5

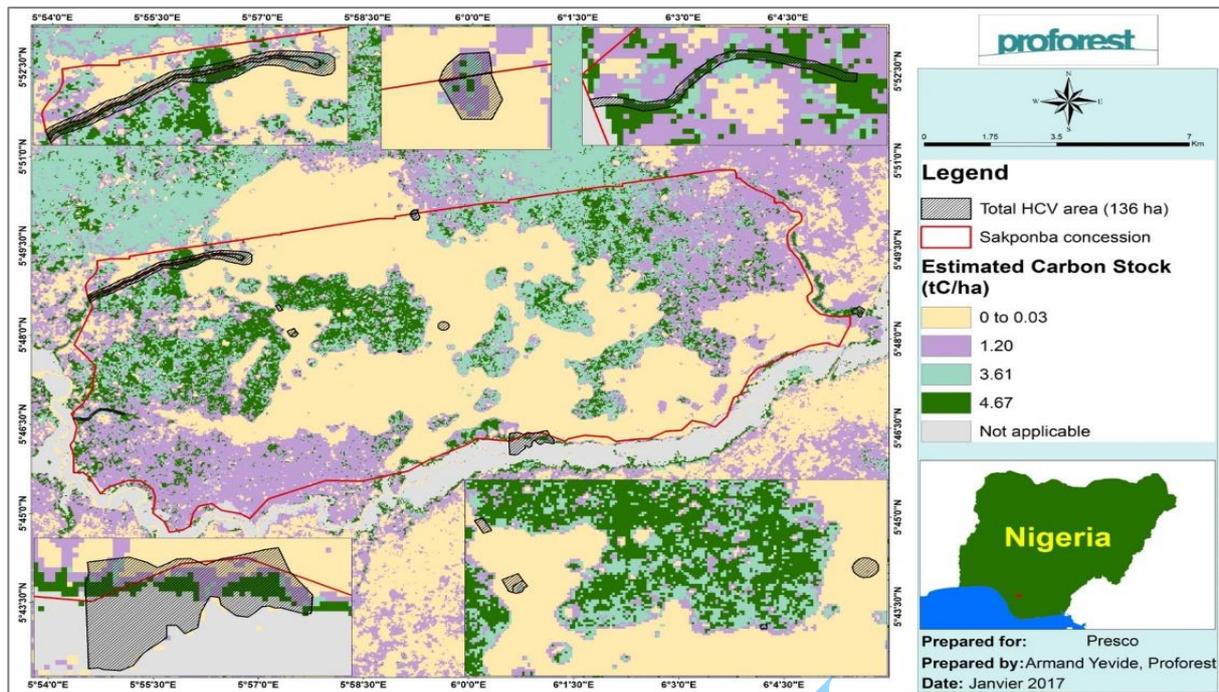


Figure 18: HCVs and their management areas overlaid with the estimated carbon stock in the concession

3.6 LUC analysis

The LUC analysis was undertaken to complement the HCV assessment. The analysis included a systematic land use change analysis utilizing satellite imagery. The analysis was conducted by Dr Sedami Igor Armand Yevide. The study consisted of a systematic land use change analysis with the use of comparative satellite imagery which shows the land use of the proposed area for the period 2005-2016. The analysis confirms Proforest's findings that the proposed development is dominated by grassland and farm and fallow lands. Sakponba concession is mostly contained within Landsat path 189, rows 56. Five scenes or tiles of clear and almost cloud-free images were selected for the classification. These data were preprocessed by atmospheric correction, i.e. the removal of atmospheric distortions in the imagery due to differences in aerosols, water vapour, haze, and illumination effects. This was done with QGIS. The output data was converted into surface reflectance. The images are procured in Level 1T preprocessing format, which means that geometric correction including orthorectification has already been applied by USGS. The images had a very good geometric matching for land use change analysis. Each Landsat image was preprocessed separately because of the different acquisition dates.

Image classification

The land cover classification was carried out with ArcGIS which uses an object based image classification method. During the HCV and Carbon Stock assessments conducted in October 2016, ground truthing data was collected and used as training sample through the maximum likelihood algorithm to classify the vegetation of Sakponba landscape for the year 2016 into six classes (Farmland, Grassland, Low to Medium Density Forest or Shrubland, Plantations, Riparian forest, and Water bodies) with an overall accuracy of 95.8% and a Kappa coefficient of 94.3%. However, for consistency reason and due to the unavailability of ground truthing data for the other years, four land use and or land cover classes were used to classify or reclassify the acquired images (see table below).

Table 11: Description of the land use or land cover categories used for the classification

Land Use/Land cover classes	Description
Riparian forest	Land covered by a natural woody vegetation along a river. This vegetation is degraded and has a low tree density.
Grassland or Open land	Land covered by grass or buildings and other man-made structures, including barren lands with exposed soil, sand or rocks.
Water bodies	Natural water bodies and artificial water bodies - seas, lakes, reservoirs, and rivers. Can be either fresh or salt-water bodies.
Other vegetation types	Land characterized by scatted trees in a mosaic of cropland, shrubland and oil palm plantation.

The land cover map for the year 2016 were reclassified and used to generate training sample for the classification of the other Landsat images. Eventually, a visual screening of the classification results was conducted in order to reduce mis-classifications and improve classification accuracy. Following the classification of imagery from the individual years, a multi-date post-classification comparison change detection algorithm was used to determine changes in land use in three intervals, 2005–2007, 2007–2009, 2009–2010, 2010–2014, 2014–2016 and 2005–2016.

As mentioned the land use change analysis concludes that there were no primary forests within the proposed development area before November 2005. The study demonstrates that there has been negligible tree cover loss or gain within the period of 2000 to 2016. This confirms the findings of the HCV assessment and local knowledge of the area.

3.7 FPIC process

In order to ensure the communities who have right to the land give their consent prior to the development of the proposed oil palm plantations, Presco initiated an FPIC process which culminated in the signing of a Memorandum of Understanding with the people of Obagie. The MoU specifies that Presco will initially develop 10,000 ha out of the 14,436 ha concession, leaving the remaining 4,436 ha for use as future farmland by the local communities. The Obagie community was initially unsure whether the MoU will be implemented and therefore took Presco to court. However, the communities have recently withdrew the court case based on the FPIC process with the communities. There is thus possibility that the size of the land earmarked for farming by the local communities could change in future. A number of documents that are related to the FPIC process which were reviewed by the assessment team include:

- **Concession map showing the 4,436 ha areas earmarked for future farming** – The assessment team were provided with copies the map which shows that Presco will develop 10,000 ha while the company continues to engage with the local people to settle the issue on the 4,436 ha future farmlands being requested by the local communities.

- **Memorandum of Understanding/Social agreement.** This was signed by key representatives of the Obagie community on behalf of the local population and the Managing Director and the Legal Advisor of Presco in October 2015.

4 Summary of management plans

The sections below provide summaries of the management plans which should be implemented and monitored to ensure all potential social and environmental negative impacts associated with the project are addressed.

4.1 Team responsible for developing management plans

The Environment and Sustainability Department of Presco has the overall responsibility to implement the mitigation and management recommendations summarized in this report.

Table 12: Internal responsibility for management plans

Position	Responsibility
Group Sustainability Manager	Ensure annual monitoring is conducted and reports are reviewed and compliant to the management plans within this report.
Director of Agriculture	Ensure all resources as necessary are provided for effective implementation of the management recommendations.
Plantation Manager	Ensure all management recommendations as communicated by Sustainability Manager and this report are implemented.
Health, Safety and Environment Manager	Facilitate compliance to management recommendation through provision of training and technical support. Monitor and report implementation of management recommendations through regular inspections.
Sociologist	Ensure all recommendations relating social issues are implemented.

4.2 Elements to be included in the management plans

HCV management plan

The recommendations for maintaining and enhancing the HCVs identified in the Sakponba concession are based on the importance of the values present and the threats they face. The Table below summarises the management and monitoring recommendations as per the HCV report.

Table 13: HCV and HCV management and mitigation plan

HCV	Brief description of value present	Main threats	Management recommendation	Monitoring recommendation
1	Species diversity Presence of two species of plants (<i>Gossweledendro balsamiferum</i> and	Existing threats <ul style="list-style-type: none"> • Potential clearing and burning of <i>Nyanchia</i> riparian forest for food crop farming 	<ul style="list-style-type: none"> • A full survey should be carried out in the set-aside area to identify and assess the population of all rare, threatened and endangered 	<ul style="list-style-type: none"> • Regular monitoring of population of rare, threatened and endangered

<p><i>Cola nigerica</i>) listed by IUCN as Endangered and Critically Endangered.</p> <ul style="list-style-type: none"> • Presence of population of species listed a rare, threatened and endangered species at national level including Red River Hog, Busl buck and Maxwell's duiker. 	<ul style="list-style-type: none"> • Cutting of <i>Cola nigerica</i> for fuelwood and destruction of <i>Gossweilerodendron balsamiferum</i> • Current pressure from hunting on species listed nationally as rare, threatened and endangered fauna species such as the Red river hog, Maxwell's duiker and Bush buck. • Destruction of the habitats of the species listed nationally as rare, threatened and endangered. • Potential threats from the palm oil plantation • Potential conversion of Nyanchia riparian forest could lead to cutting/felling and destruction of the two endangered and critically endangered plant species • Potential conversion and destruction of the habitats of the fauna species listed nationally as rare, threatened and endangered. • Hunting pressure due to influx of plantation workers • Potential conversion of the forest for farming by influx of plantation workers and demands for farm lands. 	<p>species of fauna and flora at both national and global level. The outcome of this study should inform a revision of the HCV management and monitoring recommendations</p> <ul style="list-style-type: none"> • Conservation and sustainable management of the entire Nyanchia riparian forest • Presco should collaborate with local communities and appropriate authorities to implement measures to reduce or address hunting in the Nyanchia forest area. • Presco should ensure that the Nyanchia riparian forests and the HCV management areas are appropriately mapped and clearly demarcated on the ground prior to land preparation. • Presco should ensure POME and all other waste products are disposed of appropriately and afar from 	<p>population of flora and fauna</p> <ul style="list-style-type: none"> • Regular monitoring of management areas of Nyanchia riparian forests, swamps which have been identified as HCV 1 area. • A regular monitoring system needs to be established to ensure that forest cover is maintained and hunting pressure is kept at a minimal level in the forest along Nyanchia stream. • Regular monitoring of water quality
<p>3 Rare, threatened or endangered ecosystems: The Ezenugbegbe swamp which is also a spiritual site for the people of Obagie and Orogho and other smaller swamps in the concession.</p>	<p>Existing threat</p> <ul style="list-style-type: none"> • Conversion of this swamp and other swamp areas for food crop farming by the local population is unlikely since it hosts the most significant shrine of all the communities fringing the concession. Besides, swamps are located within the extensive grassland areas of the concession which is generally not suitable for food crop farming and the local population are generally not farming in the grassland areas. <p>Potential threats</p> <ul style="list-style-type: none"> • Potential draining of ponds for oil palm development • Clearance of vegetation around ponds and wetland • Potential contamination of ponds and wetlands. The threat of converting fully or part of the swamp areas is even high given that water levels of the swamp 	<ul style="list-style-type: none"> • Clearly demarcate the swamp and its management area to avoid being mistakenly converted by land preparation team. Exclude the swamp area from all conversion activities and ensure it is adequately buffered as recommended. • Avoid application of agrochemicals close to the swamp and ponds and their buffer zones • Presco to develop appropriate SOPs in consultation and input from community leaders for effective management of the swamp area. • Education and sensitization of field workers on the importance of the swamp 	<ul style="list-style-type: none"> • Swamp area demarcated and regular monitoring of the area • Ensure yearly review of effectiveness of SOPs • Periodic review of effectiveness of workers' sensitization and awareness of the swamp area including complaints filed and community inputs on effectiveness.

		<p>areas recedes during the dry season which is also the land preparation period. This makes it crucial for reasonable buffers to be set-aside for the swamps</p> <ul style="list-style-type: none"> • Potential threat of erosion from conversion given that the terrain is generally flat and low-lying. Potential contamination from agrochemical use. 	and the need to stay away from the swamp area.	
4	<p>Basic ecosystem services</p> <ul style="list-style-type: none"> • Maintaining the hydrological and functionalities of water bodies in the concession • Critical water catchment areas required to maintain continuous flow of water to serve local communities including the Nyanchia watershed area in the concession 	<p>Existing threat</p> <ul style="list-style-type: none"> • Logging • Forest cover loss due to clearing for farming <p>Potential threats</p> <ul style="list-style-type: none"> • Loss of riparian forest from land conversion activities • Water pollution due to fertilizer and agrochemical use • Water pollution from domestic and field waste disposal • Reduction in fish and other aquatic life forms population due to pollution 	<ul style="list-style-type: none"> • Delineate and demarcate on the ground the recommended buffer for all rivers, streams and ponds particularly the Nyanchia stream. A minimum buffer of 25 metres on both sides is recommended for the Nyanchia and the unnamed stream. • Rehabilitation of all areas within the 25 m buffer of the small unnamed stream through artificial regeneration e.g. tree planting • Prepare SOPs that recognise all set-aside areas including riparian vegetation areas and ensure those areas are precluded from conversion activities • Provide and set-aside appropriate buffering of all rivers and streams as recommended by this assessment. • All other water bodies in the concession must be precluded from conversion activities • Avoid application of agrochemicals within the recommended riparian vegetation, buffer zones and watershed areas. Have an SOP in place to support • No planting and oil palm activities within 100 m from the Ethiopia River 	<ul style="list-style-type: none"> • Regular sampling of rivers and streams for testing as part of a water quality monitoring system. The system should use a Before – After / Control – Impact design whereby upstream sampling sites are established above the area of impact and downstream sites below the area of impact, with samples collected before plantation activities begin and ongoing after development. • Regular on-site monitoring of riparian vegetation and Ekukusu areas to identify gain or reduction of vegetation cover. • Review of effectiveness of SOPs at least quarterly from the first year and thereafter once a year.
5	<p>Local community basic needs:</p> <ul style="list-style-type: none"> • NTFP gathering 	<p>Existing threat</p> <ul style="list-style-type: none"> • Excessive hunting • Over-harvesting of NTFPs 	<ul style="list-style-type: none"> • Delineate and respect the recommended set-aside for the Ekukusu shrub 	<ul style="list-style-type: none"> • Regular monitoring of the size of HCV areas

	<p>from the forest along the Nyanchia and Ekukusu shrub areas</p> <ul style="list-style-type: none"> Fishing and collection fish from pockets of water in the Nyanchia stream during dry season Water supply for household use 	<p>Potential from oil palm development</p> <ul style="list-style-type: none"> Loss of forest land and NTFP areas to oil palm plantation Loss of access to hunting grounds Loss of Ekukusu shrub Loss of water sources for household use Potential reduction of fish stock from Nyanchia due to pollution and clearing of riparian buffer <p>Existing threat</p> <ul style="list-style-type: none"> Excessive hunting <p>Potential from oil palm development</p> <ul style="list-style-type: none"> Loss of forest land and NTFP areas to oil palm plantation Loss of access to hunting grounds Loss of water sources for household use Potential reduction of fish stock from Nyanchia due to pollution and clearing of riparian buffer 	<ul style="list-style-type: none"> Work with the communities to agree and implement measures to control illegal logging in riparian vegetation 	<ul style="list-style-type: none"> Regular patrols to check illegal logging in the riparian zones
6	<p>Areas critical to local communities' traditional cultural identity: This includes the many shrines primarily the Ezenugbegbe, Nyanchia, Arousa etc which are in the concession</p>	<p>Exiting threats</p> <p>None</p> <p>Potential threats</p> <p>The main threats to the identified shrines is the potential conversion of them or conversion of part of the required management areas. Given that the shrines are all located either along a river or in a pond/swamp area, conversion of the riparian vegetation or any activity that could cause drying of the water in the stream or in the swamp could be a risk to the shrines. Again, the attitude and practices by migrant workers of the future plantation might also be offensive to the traditional authorities and for this reason, it may be useful for the company to implement proactive additional measures to maintain the integrity of the shrine.</p>	<ul style="list-style-type: none"> Collaborative management of HCV 6 areas with local communities Prepare SOPs that ensure HCV 6 and their management areas in the plantation are set-aside and protected. Presco may want to ensure the presence of community leaders during land clearing around HCV 6 areas Raising notification and/or warning sign-posts such as 'do not shout or make noise, do not urinate here etc. <p>Include evaluation of local population's satisfaction of the management of HCV 6 areas during major periodic meetings</p>	<ul style="list-style-type: none"> Existence of collaborative management and monitoring of its effectiveness. A simplified HCV monitoring system/protocols in collaboration with local communities Include evaluation Regulation review of local population's satisfaction of HCV 6 management areas

Environmental and Social Impact assessment management plans

The monitoring and management actions laid out in the table above are aimed at mitigating negative environmental and socio-economic impacts relating to HCVs whiles enhancing the positive ones. The implementation of these actions has received the commitment and support of the management of Presco. The main actions for reducing negative impacts whiles enhancing the positive ones have therefore been detailed below as critical management measures for consideration and execution by the management of Presco.

Management of potential environmental impact:

The Table below provides a summary of the potential environmental impacts and their proposed mitigation measures.

Table 14: Environmental Management Plan for the Proposed Sakponba project

Activity phase	Environmental Aspects	Type of Impact	Mitigation measures	Residual Impact
Pre-construction preparation phase	Land Degradation on or near sensitive habitats.	Sitting the project on a sloping land may result in higher erosion potential. As a result of soil erosion, soil particles will be transported by run-off water and sediments will be fed into river system. Increased sediment load will induce migration of aquatic fauna. Degradation of sensitive habitats will result in loss of biodiversity and displacement of indigenous species.	There will be side pits excavated at intervals to collect soil particles including sediments to avoid sediment load of water bodies. Planting of cover crops (prureira and mucuna) on the exposed portions of the land.	High
	Air quality	Dust and gaseous emissions from land preparation leading to high suspended particulates in the atmosphere.	Presco Plc shall ensure the following <ul style="list-style-type: none"> - Low-emission/high efficiency engines shall be used - Movement of men and materials shall be properly coordinated to optimize vehicle use and resultant emissions - Dust and particulate barriers shall be used during operation - Avoid burning on site (i.e. zero burning) 	Low
	Noise and vibration	Noise emissions generated by heavy-duty vehicles and workers activities and resultant hearing impairment on site workers.	Presco Plc shall ensure the following <ul style="list-style-type: none"> - Noise attenuation measures such as installation of acoustic mufflers on large engines and equipment; - Hearing protection shall be provided and usage enforced for workers on site. 	Low
	Water Quality and Hydrology	Increased receiving water body turbidity from runoff from the plantation.	Presco Plc shall ensure the following <ul style="list-style-type: none"> - Stack demolition materials properly to reduce turbidity effect on surface runoffs; - Adequate contingency measures shall be put in place to contain accidental spills, ensure spill containment equipment are available on site. 	Low

	Solid Waste	<ul style="list-style-type: none"> - Solid waste constituting aesthetic nuisance - Sewage nuisance 	<p>Presco Plc shall ensure the following</p> <ul style="list-style-type: none"> - Waste are contained and removed regularly by her own waste management plan already in place. 	Low
	Hostility	<p>Land acquisition and proper take-over</p> <p>Conflicts between the migrants and the local people</p>	<p>Presco Plc shall ensure the following</p> <ul style="list-style-type: none"> - Conflict resolution mechanism is instituted - Employ as much local labour as possible - Adequate stakeholders forum and information shall be given to communication, 	High

Management of potential socio-economic impact:

The management recommendations are further summaries in the Table 15 below.

Table 15: Potential Socio-economic Impact and Mitigation and Management Measures

Potential Impact	Mitigation Measure(s)
Construction and Operational Phases:	
<p>-Economic displacement of private farmers and customary land users, affecting access to agricultural land and natural resources.</p> <p>-Economic displacement through the loss of palm oil processing opportunities, having a significant indirect impact on household income and livelihoods, especially for households in Obanakhoro.</p>	<p>-The development of alternative livelihood strategies should be the preferred mitigation measure, maximizing all possibilities for involvement in employment opportunities available. Although many of these positions will be skilled positions, the establishment of appropriate training and skills development at an early stage will allow local community members to benefit from such opportunities.</p> <p>-A Livelihood Restoration Plan and Community Development Plan should be developed to ensure households are not left worse off following displacement.</p> <p>-Establishment of grievance mechanism prior to project implementation to facilitate the resolution of affected community concerns and grievances, ensuring ongoing interaction with the community in order to build trust and maintain relationships throughout the life of the project.</p>
<p>-Creation of employment opportunities.</p> <p>-Opportunities for skills development and training.</p>	<p>-Establishment of a "local labour desk" at the Sakponba estate office to identify a local labour pool.</p> <p>-Implementation of skills development programmes to ensure support local population in obtaining employment opportunities</p>
<p>-Impacts on water levels and water quality through possible pollutants.</p>	<p>Surface Water Impact Assessment and quality monitoring recommendations should be considered.</p>
<p>-Noise and dust pollution related to nursery and plantation establishment.</p>	<p>Noise and Air Quality Impact Assessment recommendations should be considered.</p>

-Increased irritation especially in the directly affected communities, which may cause social distress and reaction against the project.	
Population influx through nursery and plantation workers and job seekers resulting in social tensions and an increase in sexually transmitted diseases, notably HIV/AIDS	-Clear communication of all available employment positions to minimise population influx. -Implementation of health development plans including upgrading facilities and awareness campaigns surrounding HIV/AIDS.
Potential for conflict through the displacement of smallholders and the livelihood base of a large proportion of the community.	A conflict prevention and management mechanism should be developed with the aim to manage conflict and bring about positive change. This will be assisted by concurrent community and stakeholder engagement process.
Increase in traffic and safety hazards to the local population and workers.	A detailed health and safety plan must be developed to mitigate the construction and operation risks of the proposed project on the surrounding communities. This plan must take cognisance of the following: -Increased risk of traffic through built-up areas; -Safety measures in relation to the storage, transportation and use of chemicals and petroleum products.
Increase in business opportunities in local services caused by increased demand for goods and services and spending power from Sakponba nursery and plantation establishment workers.	-Explore possibilities to include training opportunities for developing business opportunities in Community Development Plan. -Consider funding small business development. All these are measures to enhance and sustain the business opportunities.
Employment opportunities	-Establishment of a "local labour desk" at the Sakponba estate or possible contractor offices to identify local labour pool. -Implementation of skills development programmes to ensure support for local population to obtain employment opportunities.
Improved services and community development potential.	Develop Community Development Plan taking into account all communities within the areas of influence of the project, with the aim to long-term sustainable development.
Decommissioning Phase:	
A temporary increase in employment followed by a decrease. This likely to occur because the oil palm and rubber development will span for 30 years and skilled workers requirement will be changing from nursery to plantation then to milling.	A program of retrenchment and re-training during the operational phase, providing employees with clear, transparent information on planned activities and closure dates, offering full retrenchment packages or relocation to maintain employment at other operations sites where possible.
Change in economic benefits to subsistence agriculture cum other local livelihoods.	Community Development Plan to include skills training and development to ensure transferrable skills and options for alternative livelihood strategies

Carbon and Greenhouse Gas Management plans

The following management recommendations are made for effective management of carbon and greenhouse gas based on the carbon emission sources identified in the GHG Calculator.

HCV management and set-aside areas

The assessment has recommended for set-aside area of a minimum of 136 ha of natural areas including 109.9 ha of degraded riparian forest along the Nyanchia stream in the North-western part of the Sakponba concession. In addition to this, riparian buffer vegetation would be marked out in the field prior to land preparations. Following the recommended buffer for streams and other water bodies, Presco management has set-aside additional 126 ha as buffer zones. This brings the total set-aside areas to 262 ha. Recommended set-aside areas for buffering of rivers and streams are outlined below:

Table 16: Recommended buffer for all streams rivers in and around the concession

Water body category	Width (m)	Recommended buffer zone on each side (m)
Perennial streams (eg Nyanchia)	< 5	25
Major perennial rivers	[5 - 20]	50
Big rivers (eg Ethiopie)	> 20	100

Managing emission from fertilizer

Emission from fertilisers is a major source of GHG on the plantation. In order to reduce these emissions, the operation will optimise the use of fertiliser in the plantations. All forms of fertiliser use shall be justified following periodic soil and tissue sampling, and shall be applied by trained staff with supervision from management. Fertiliser would only be applied to address identified deficiencies from tissue sampling reports. The company will also strive to use organic matter from its operations to complement soil nutrition and physical properties. Typically, the operation will ensure that EFB is returned to the field, palm fronds are stacked. The company would also make optimal use of nitrogen fixing cover crops in its operations to help minimise the amount of organic Nitrogen that would be required for optimum yield.

Managing emissions from POME

In order to ensure better management of GHG emission from the POME, SIAT group has committed itself to equip all its subsidiaries with efficient POME treatment. In line with this commitment, Presco mill, which is going to process the FFB from the Sakponba concession, has been already equipped with a biomethanisation plan to reduce GHG emissions.

Emissions from FFB Transport

In order to minimise emissions from FFB transport, the operation would ensure the use of trucks that are very fuel efficient and large enough to minimise the number of trips. Additional measures to be implemented would include regular and scheduled maintenance of vehicles to maintain their fuel efficiency whilst sourcing only highly quality fuel that is guaranteed to give optimal performance of vehicles. Appropriate measures will be taken to ensure road planning, design and construction are carried out in a way that minimise the travel distance between the harvesting sites and the processing mill. It is recommended that the company develops an implemented road maintenance

programme that keeps the roads in good condition all year around. This would also be essential in reducing the amount of fuel used in FFB transport.

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