



**CLIMATE, COMMUNITY, BIODIVERSITY ALLIANCE**  
**PROJECT DOCUMENT**

# TABLE OF CONTENTS

<b><u>G. GENERAL SECTION.....</u></b>	<b><u>3</u></b>
G1. ORIGINAL CONDITIONS AT PROJECT SITE .....	3
G2. BASELINE PROJECTIONS.....	22
G3. PROJECT DESIGN & GOALS.....	31
G4. MANAGEMENT CAPACITY AND BEST PRACTICES .....	45
G5. LEGAL STATUS AND PROPERTY RIGHTS.....	57
<b><u>CL. CLIMATE SECTION .....</u></b>	<b><u>70</u></b>
CL1. NET POSITIVE CLIMATE IMPACTS .....	70
CL2. OFFSITE CLIMATE IMPACTS (“LEAKAGE”).....	75
CL3. CLIMATE IMPACT MONITORING .....	78
<b><u>CM. COMMUNITY SECTION .....</u></b>	<b><u>89</u></b>
CM1. NET POSITIVE COMMUNITY IMPACTS.....	89
CM2. OFFSITE STAKEHOLDER IMPACTS.....	91
CM3. COMMUNITY IMPACT MONITORING .....	92
CALDERON COMMUNITY ANALYSIS .....	92
LA FONSECA COMMUNITY ANALYSIS .....	93
MONITORING PLAN.....	94
<b><u>B. BIODIVERSITY SECTION .....</u></b>	<b><u>98</u></b>
B1. NET POSITIVE BIODIVERSITY IMPACTS .....	98
B2. OFFSITE BIODIVERSITY IMPACTS .....	100
B3. BIODIVERSITY IMPACT MONITORING .....	101
ENVIRONMENTAL MONITORING PLAN .....	103
<b><u>GL1. CLIMATE CHANGE ADAPTATION BENEFITS .....</u></b>	<b><u>109</u></b>
<b><u>GL2. EXCEPTIONAL COMMUNITY BENEFITS .....</u></b>	<b><u>115</u></b>
<b><u>GL3. EXCEPTIONAL BIODIVERSITY IMPACTS .....</u></b>	<b><u>119</u></b>
<b><u>ANNEX A BIODIVERSITY RESULTS.....</u></b>	<b><u>121</u></b>
RIO SIQUIA .....	121
RIO KAMA .....	124

---

---

## G. GENERAL SECTION

---

---

### G1. ORIGINAL CONDITIONS AT PROJECT SITE

---

*The original conditions at the project site before the project commences must be described. This description, along with projections, will help determine the likely impacts of the project.*

G1.1. The location of the project and basic physical parameters (e.g., soil, geology, climate).

#### **Administrative boundaries**

The project is located in the Nicaraguan municipality of El Rama, between latitudes 11° 43' 12" and 12° 18' 00" north and longitudes 83°58'15" and 84°18'00" west. Bordering to the North is the municipality of El Tortuguero, to the South the municipalities of Muelle de los Bueyes and Nueva Guinea, to the East the municipalities of Kukra Hill and Bluefields and to the West the municipalities of Santo Domingo and El Ayote.

**Figure 1 Macro location of the project sites within Nicaragua**



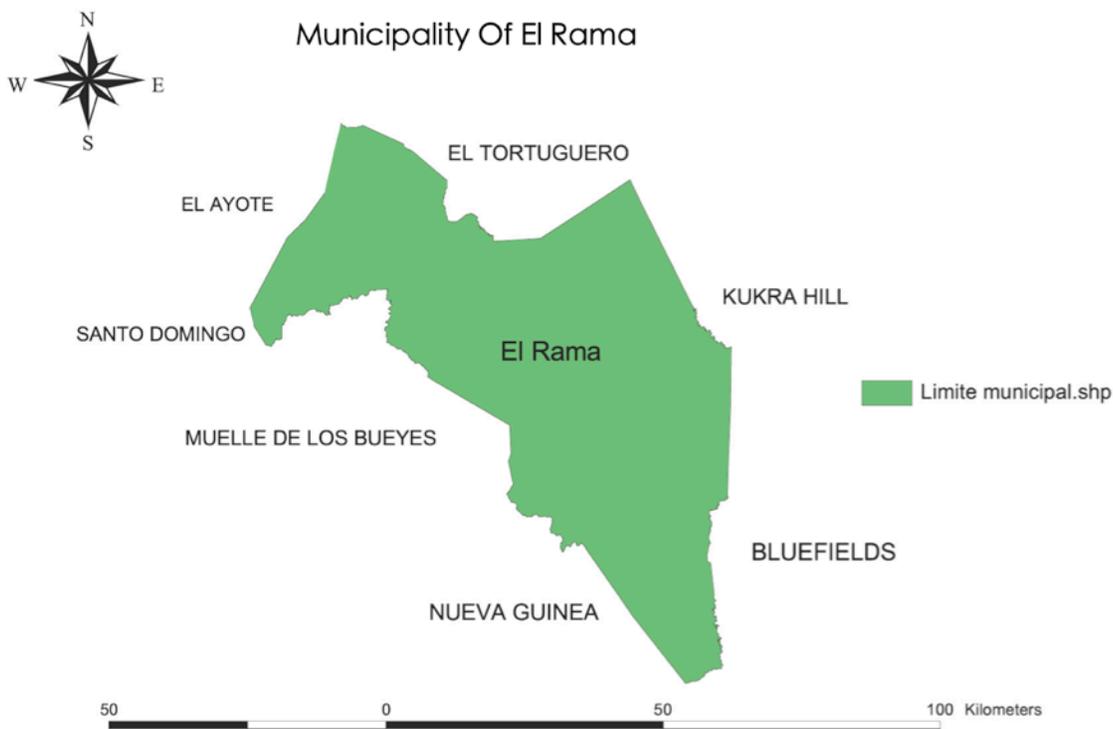
### **The Southern Autonomous Region of the Atlantic (RAAS)**

In 2003, the Atlantic Coast Region of Nicaragua gained autonomy status and two states were created: The Region Atlantica Autonómica del Norte (RAAN) and Region Atlantica Autonómica del Sur (RAAS). The two states represent half of Nicaragua's land area but only around 10% of the total population.

Regional authorities are in charge of the provision of health, education, cultural, transport and community services in coordination with central government or the respective ministry. The Atlantic states have some financial autonomy in terms of setting taxes, but their overall budget needs to be approved by the central government. The autonomy of the Atlantic states has a strong cultural component, which manifests itself in the right to bilingual education and a land tenure system, which takes into account traditional land use rights of minorities.

The RAAS has historically been divided into twelve municipalities, one of which is El Rama. However, in late 2011, the Central Government announced that the municipality of El Rama was going to fall within the Department of Chontales.

**Figure 2 Location of El Rama municipality**

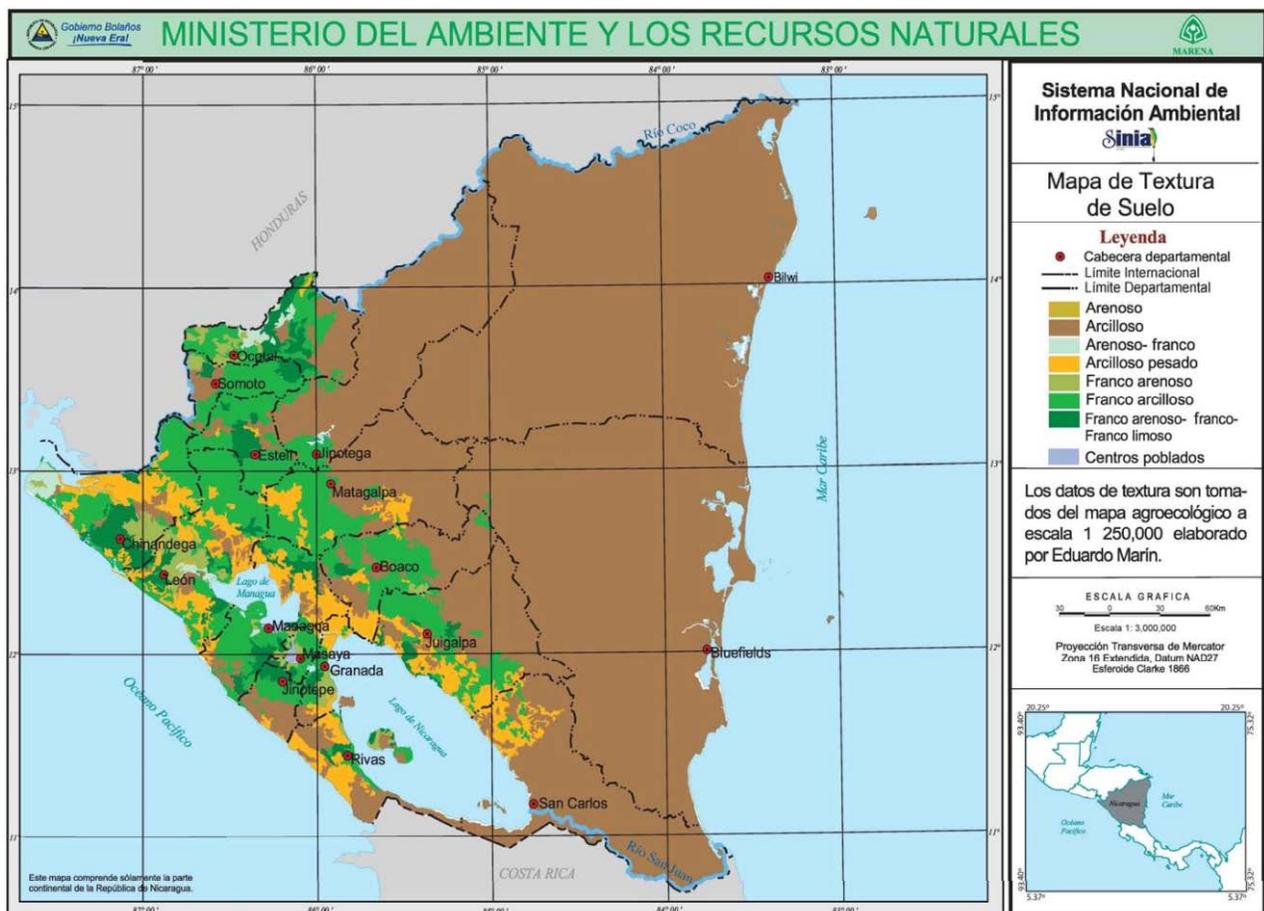


The municipality comprises a narrow strip of alluvial soil off the Siquia River, which forms the southern border of EcoPlanet Bamboo’s Rio Siquia Farm and to the east the Calderon River acts as the boundary. The area surrounding the immediate project sites is comprised of pastureland, shrubland and small disconnected areas of remaining tropical forest.

### Topography and Soils

The El Rama municipality forms part of Nicaragua’s central mountain region and with the principal topographical feature being the Cordillera Amerrisque. The elevation in this region is around 10 metres above sea level (masl). The underlying geology of the El Rama region consists of varied lithological material. Different mineralogical composition and variable geological age have given the soils physic-chemical properties that create a soil mosaic of wide variety. As indicated by the map below, the main soil type across the Atlantic region is clay. Soils have deteriorated following extensive deforestation and continued erosion of topsoil layers, which has led to lower soil fertility and productivity.

**Figure 3 Soil map of Nicaragua**

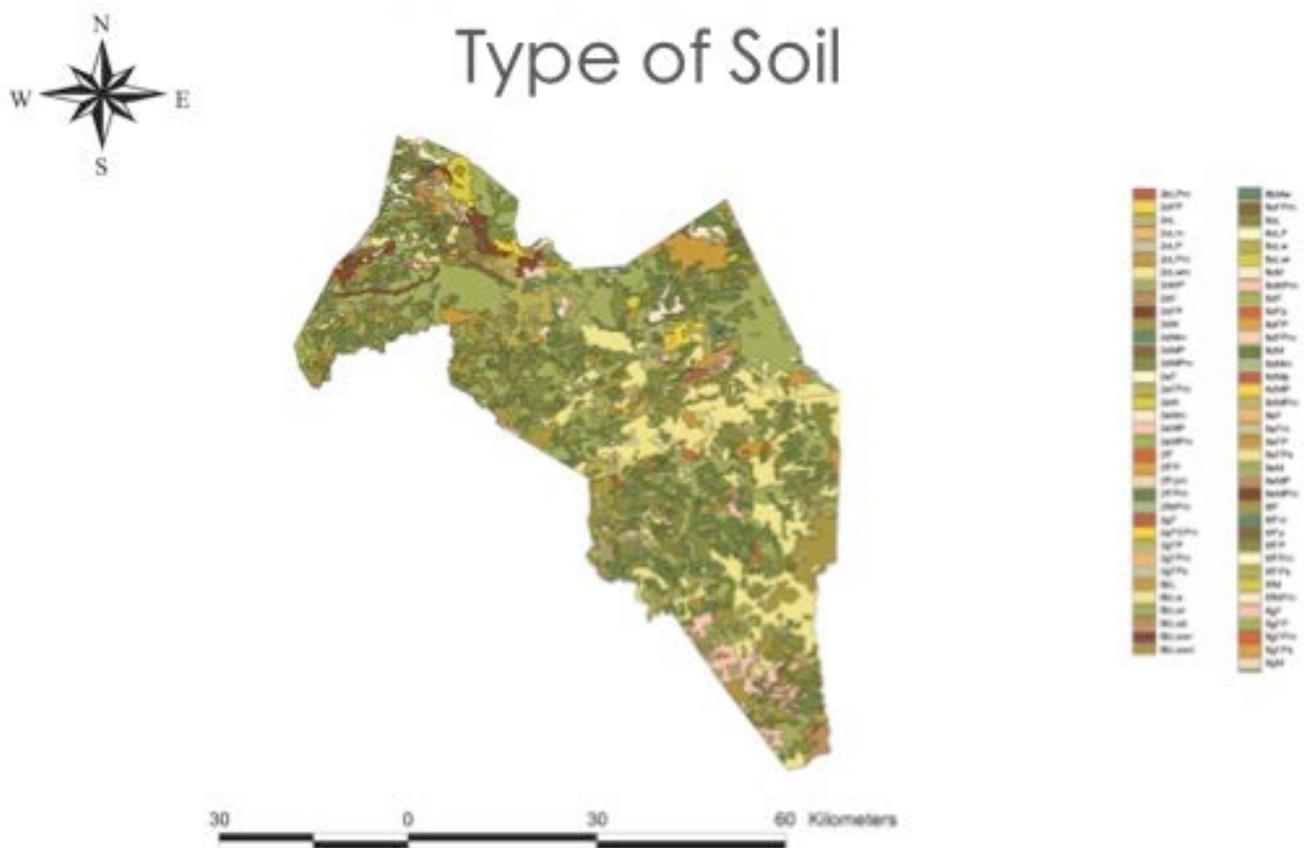


The municipality of El Rama represents a highly variable relief pattern, changing from the flood plains of the eastern coastal side to the mountainous western regions. Approximately 42% of the territory is located in the low elevation areas of the mouth of the Rio Escondido, which represents recent alluvial sediments. Soils have been subject to the strong influence of hydromorphic patterns due to poor drainage, high water table flooding and water logging, the effects of which have been exacerbated by rampant deforestation and land degradation.

According to the classification of the Department of Agriculture of the United States, the Atlantic Coast of Nicaragua has two dominant types of soils: Inceptisols and Ultisols. The soils of the Atlantic Coast are acidic; rich in aluminum, iron and silica with a pH of between 4.5 to 5.5 and have very fine texture, compact (clay) colored brown to red due to the presence of oxides, with argillic horizons with medium cationic exchange capacity and low base saturation. Due to constant heavy rain that causes leaching of nutrients, combined with the practice of clear-cutting in the region, these soils are easily eroded and have low fertility.

These soils are suitable in the long term only for forestry related activities, as they cannot support continuous agriculture and degrade eventually to infertile grasslands. Sections below detail the levels of degradation within the project boundaries.

**Figure 4 Detailed soil map of El Rama Municipality**



### **Land use**

The most common land use within the area is low intensity cattle grazing predominantly for milk production. Natural vegetation and shrub regrowth is cleared and the land often cultivated for 2 to 3 years. The land is then abandoned for 5 or 6 years with a few head of cattle per hectare, and the cycle starts again.

### **Deforestation**

Deforestation in the Atlantic states over the past 30 years has been extreme. In the early 1970s more than 90% of this land mass was covered in dense tropical forest. Large scale clearance during the next decades until the mid-1990s left around 30% of the municipality still covered with forest, but since then forest cover has reduced dramatically to around 15%.

Deforestation, combined with the heavy agricultural activity on small farmlands, has accelerated soil erosion. This erosion has increased the volume of sediment carried by the streams and degrades the water quality of the upland and downstream areas.

## **Hydrology**

Around 90% of all the surface water in Nicaragua drains into the Caribbean Sea. As a result the RAAN and the RAAS have an overabundance of surface water. El Rama lies in the Rio Escondido catchment area and in the Caribbean Coast drainage region. This drainage region includes the following major water flows:

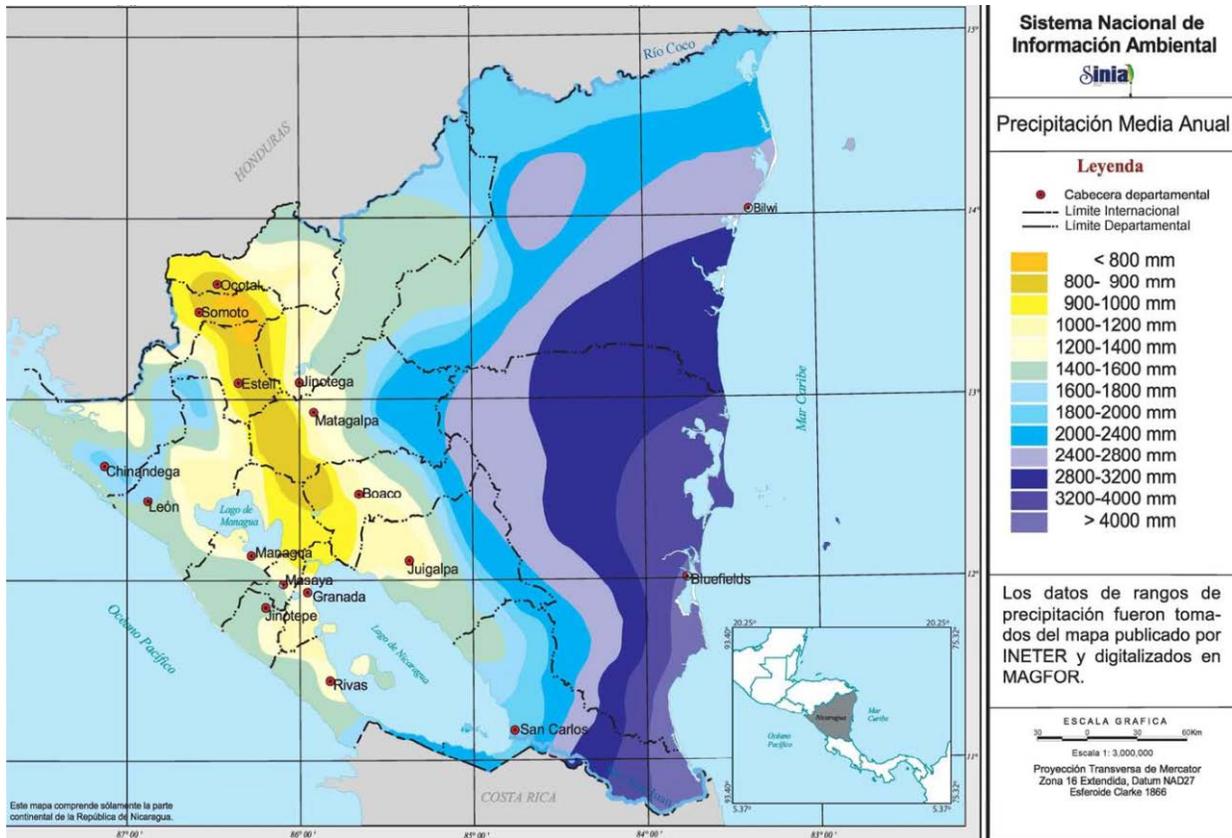
- Rio Coco and its tributaries, which are Rio Bocay, Rio Esteli, and Rio Amaka;
- Rio Wawa;
- Rio Kukalaya;
- Rio Bambana;
- Rio Prinzapolka;
- Rio Grande de Matagalpa and its main tributary, Rio Tuma;
- Rio Kurinwas;
- Rio Escondido and its system, which includes Rio Siquia, Rio Mico, and Rio Kama;
- Rio Punta Gorda; and
- Rio Indio.

Both of the distinct land areas within the proposed project areas are bordered by tributaries of the Rio Escondido and are named after these - Rio Siquia Farm and Rio Kama Farm.

## **Climate**

The project areas are located within the Humid Tropical Zone, with the climate of the project site being hot, humid and characterised by two seasons: A dry season from January to April and a wet season from May to December. Precipitation ranges from 2,000mm to 4,000mm per year. The wettest month is July with around 550mm of rainfall. The mean annual temperature is 25.4 °C and mean average humidity is 83%. There is only a difference of three degrees Celsius of the average temperatures between the hottest and coolest months.

**Figure 5 Average rainfall distribution for Nicaragua**

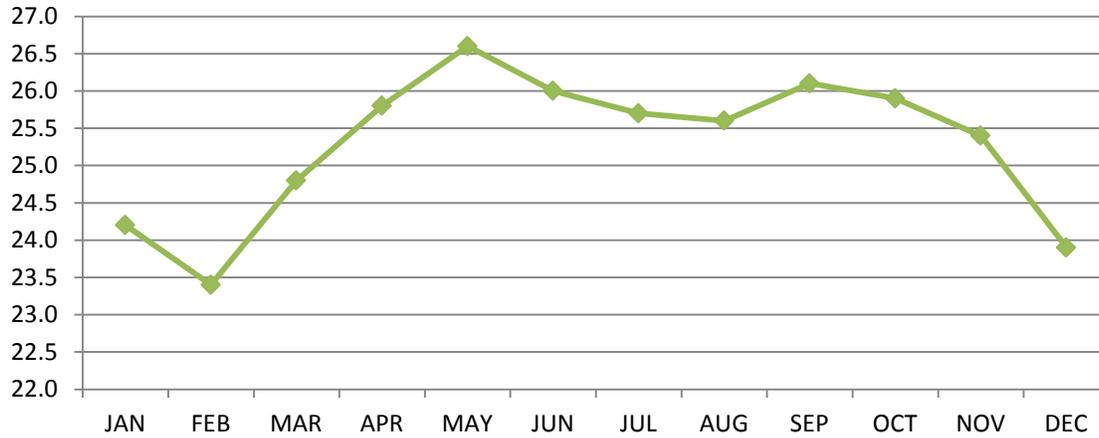


The below graphs give average climatic data for El Rama, at the nearest data collection station to both project sites.

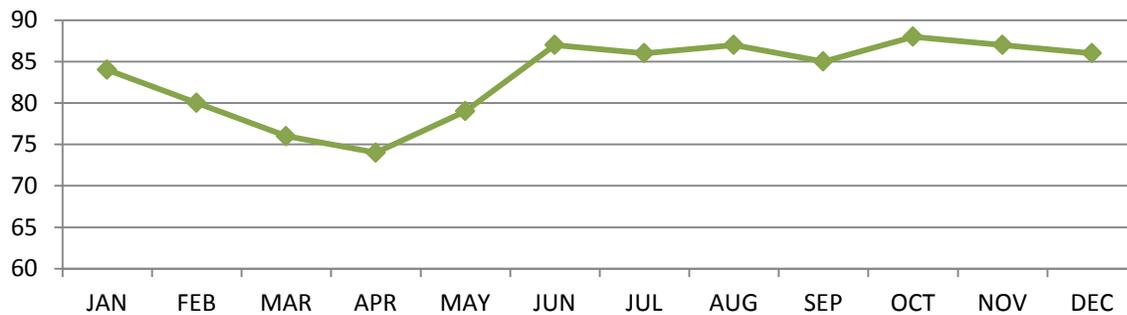
**Figure 6 Average monthly rainfall (mm)**



**Figure 7 Average Monthly Temperature (C)**



**Figure 8 Monthly average of relative humidity**



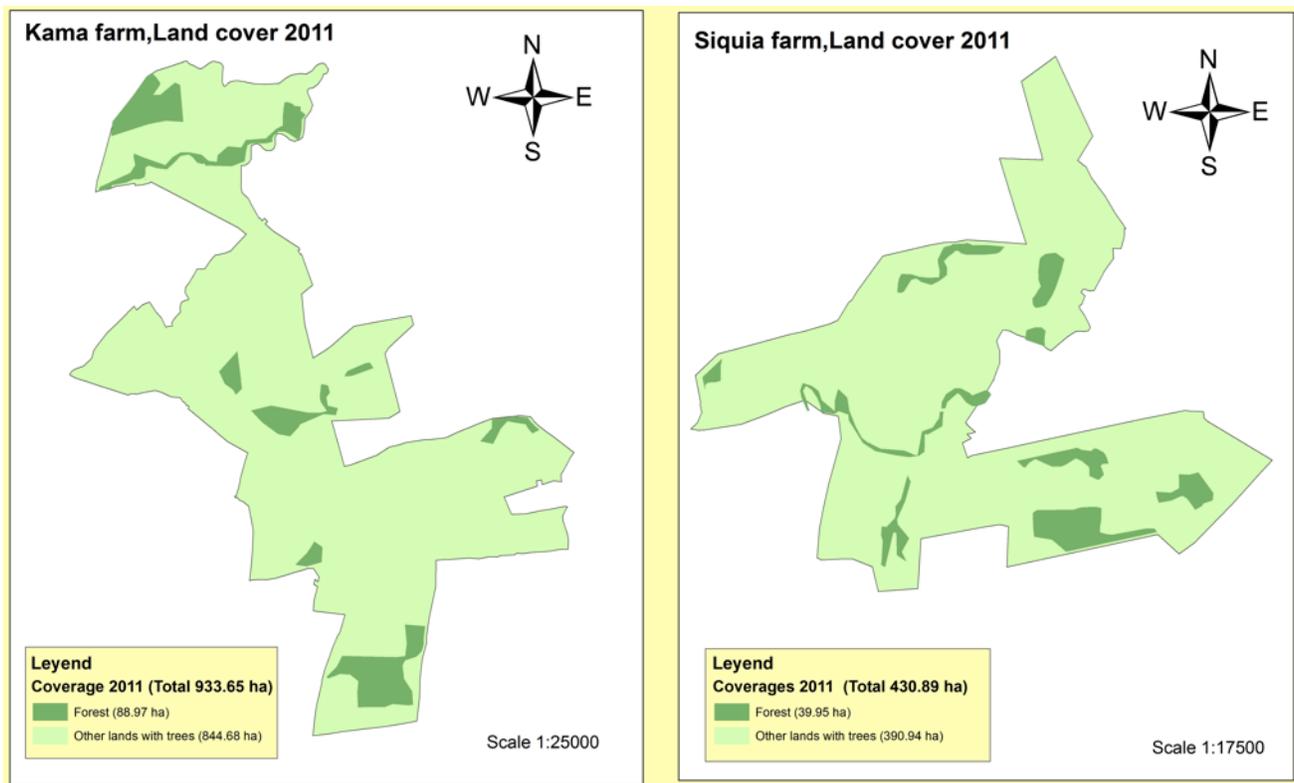
### G1.2 The types and condition of vegetation at the project site.

The total project area covers 1,365 hectares split between the two unique locations. Remote sensing and GIS work shows that deforestation of these areas occurred predominantly in the late 1970's and 1980's, with a continued trend of forest clearance and degradation of remaining forest areas.

The project areas contain 2 unique ecosystems:

- Those classified as "forest" under Nicaraguan law.
- Other lands with scattered trees

**Figure 9 Ecosystem types prior to the occurrence of project activities (2010)**



### **Rio Siquia**

The project area of Rio Siquia Farm covers 430 hectares, of which 388 hectares have been planted in 2011 with 42ha (9.77%) having been set aside for conservation and biodiversity purposes. The forest areas have been classified as a semi-deciduous broadleaf forest strongly degraded by nature and human effects, with the remaining areas representing predominantly old pasture lands with scattered trees.

Despite being in an area that has been extensively affected by human activities, specifically by intensive farming, there remains a relatively high level of floristic diversity. *Miconia argentea* and *Byrsonima crassifolia* are the most abundant and dominant species, with a relative abundance of 28.2% and 24.5% respectively in the relief and in different forest strata. Next in abundance are *Cordia alliodora* and *Chimarrhis latifolia*.

### **Rio Kama**

The project area of Rio Kama covers an initial 921 hectares, of which 702 hectares were planted in 2011, with the remaining 214ha (24%) being maintained or expanded into conservation areas. Around

25 hectares of primary forest still exist as well as considerable riparian forest. A total of 92 species of trees were counted on the Rio Kama Farm.

### G1.3 The boundaries of the project area and the project zone

The boundaries of the project areas are two micro-locations of the Rio Siquia Farm and the Rio Kama Farm; see figures 10, 11 and 12. The project areas are the directly affected area, as project activities will be conducted here. The project expects areas outside the project areas to be positively influenced both directly and indirectly by project activities throughout the lifetime of the project. Therefore, surrounding the project areas are directly and indirectly influence areas, which together with the project areas makes up the project zone.

The project's boundaries were chosen for their optimal ability to maximize social and environmental impact, both in the project areas and the surrounding areas of influence. Impacts include decreased soil erosion, biodiversity conservation, and improved ecosystem services such as clean water and air, as well as the provision of stable employment, improved ability to mitigate climate change, and local community capacity building.

#### **Micro-locations**

##### **Rio Siquia**

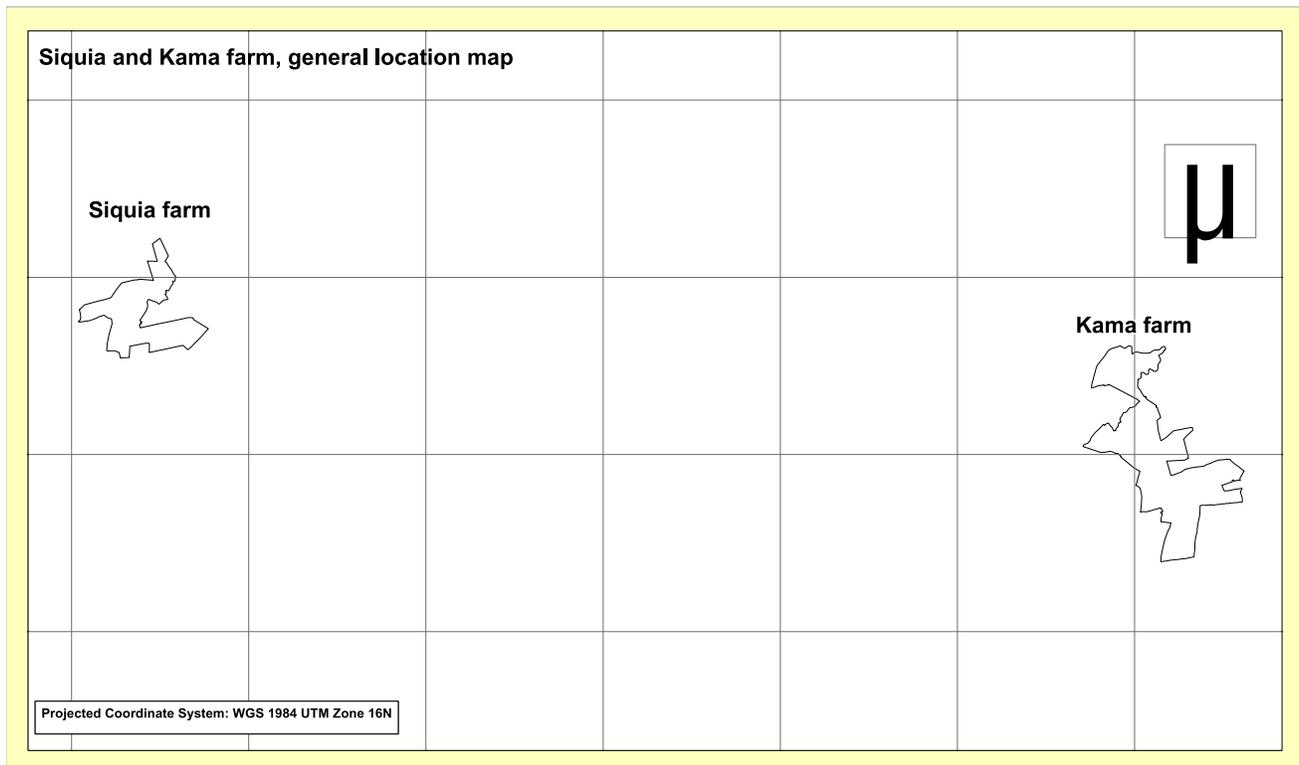
The Rio Siquia Farm is located in the region of Calderon, two km away from the all-weather El Rama-Wapí road, and 23.5 km from El Rama town. Its coordinates are UTM 1360000 north latitude and UTM 797000 west longitude. Its boundaries are North regions of Monte Rosa and La Raicilla, South with regions of Muelle Real and Siquia River, East regions of La Raicilla, el Areño and Cuatro Esquinas, and West region of Mataka. The project boundaries include 235 ha of directly affected areas, 201.36 ha of directly influenced areas, and 213.72 ha of indirectly influenced areas.

##### **Rio Kama**

The Rio Kama Farm is located in the district of La Palma, at 35 km away on the all time road of El Rama - Kukra Hill. Its coordinates are UTM 13°58'00 00" North and UTM 082°82'00 00' West. Its boundaries are to the North with the villages of Santa Rosa and Aguas Calientes, to the South with the villages of Las Lapas, San Ramón and Soncuan, to the West with the municipality of Kukra Hill, and to the West with the village of La Raicilla and Caño Wilson. The project boundaries include 889.59 ha of directly affected

areas, 511.58 ha of directly influenced areas, and 477.38 ha of indirectly influenced areas.

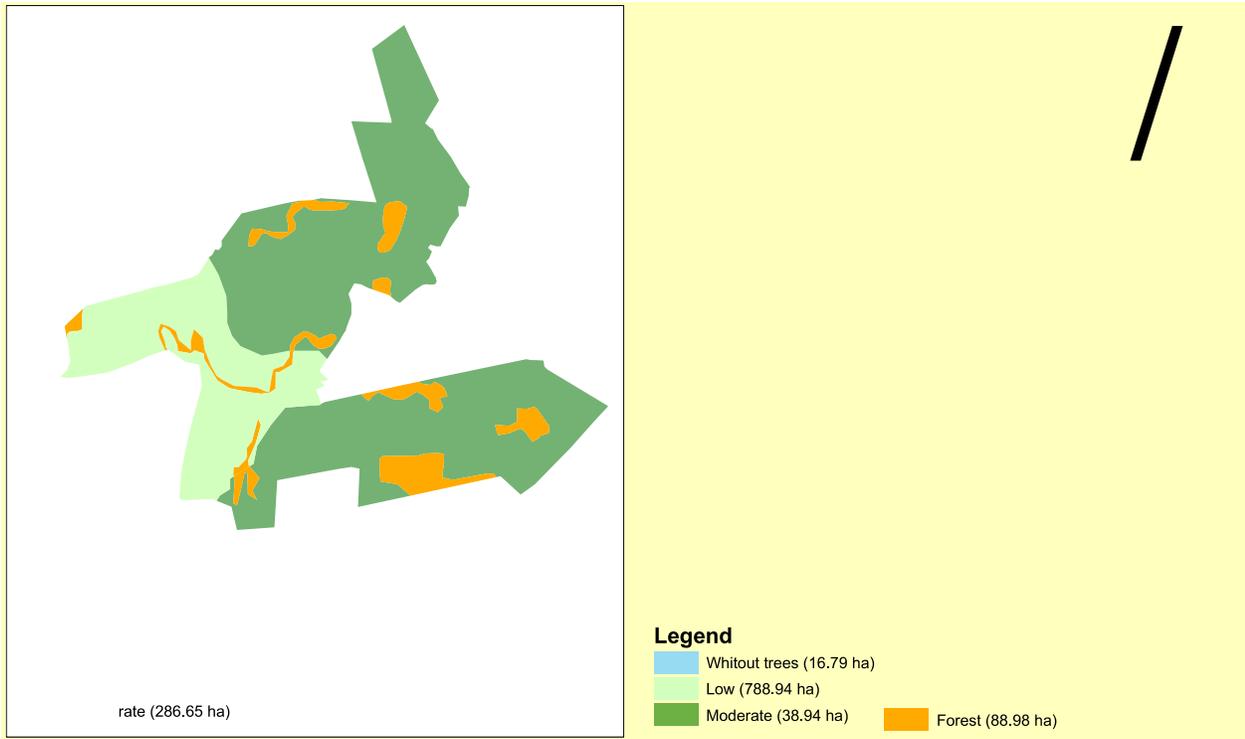
**Figure 10 The project areas**



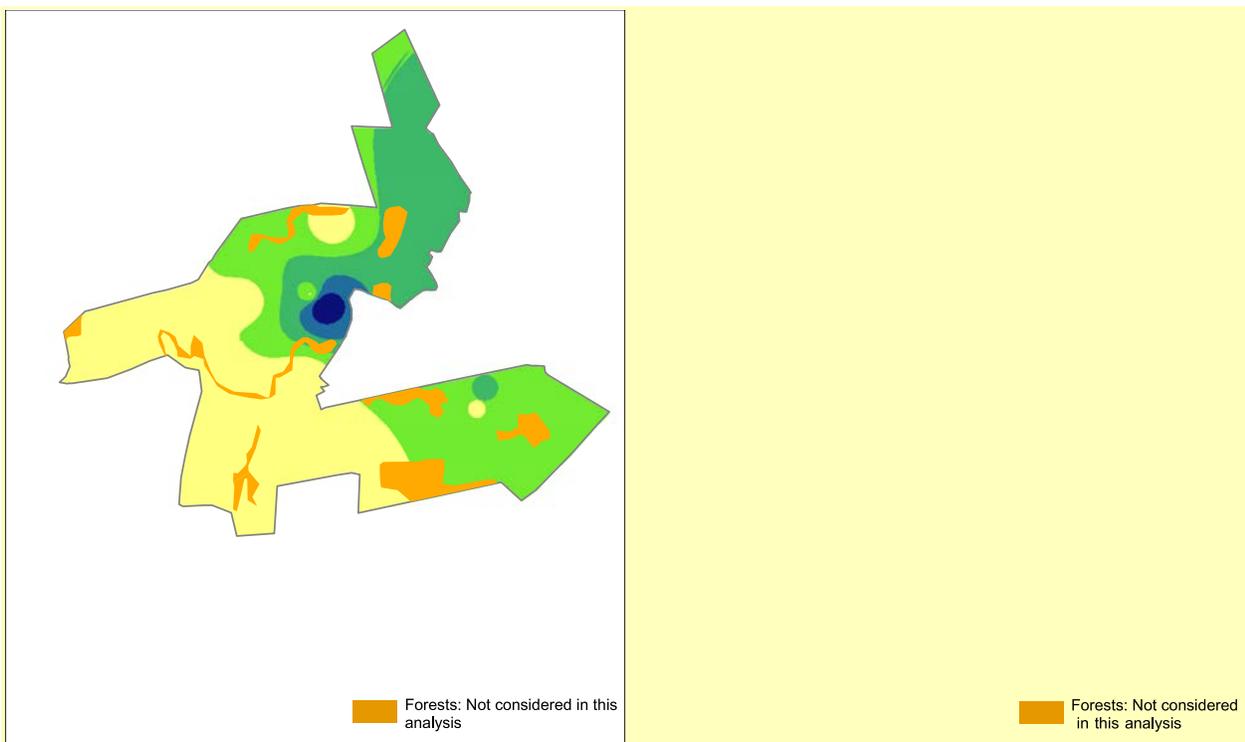
G1.4 Current carbon stocks at the project site(s), using stratification by land-use or vegetation types and methods of carbon calculation (biomass plots, formulae, default values) from the Intergovernmental Panel on Climate Change's Good Practice Guidance (IPCC GPG) or a more robust and detailed methodology.

As the areas undergoing project activities all fall into the broad category of "land (or pasture) with scattered trees" the project proponents have stratified the project areas according to the density of trees in the baseline scenario, as this will effect the number of bamboo clumps planted per hectare and therefore the associated carbon gains.

**Figure 11 Ex ante stratification of project site**



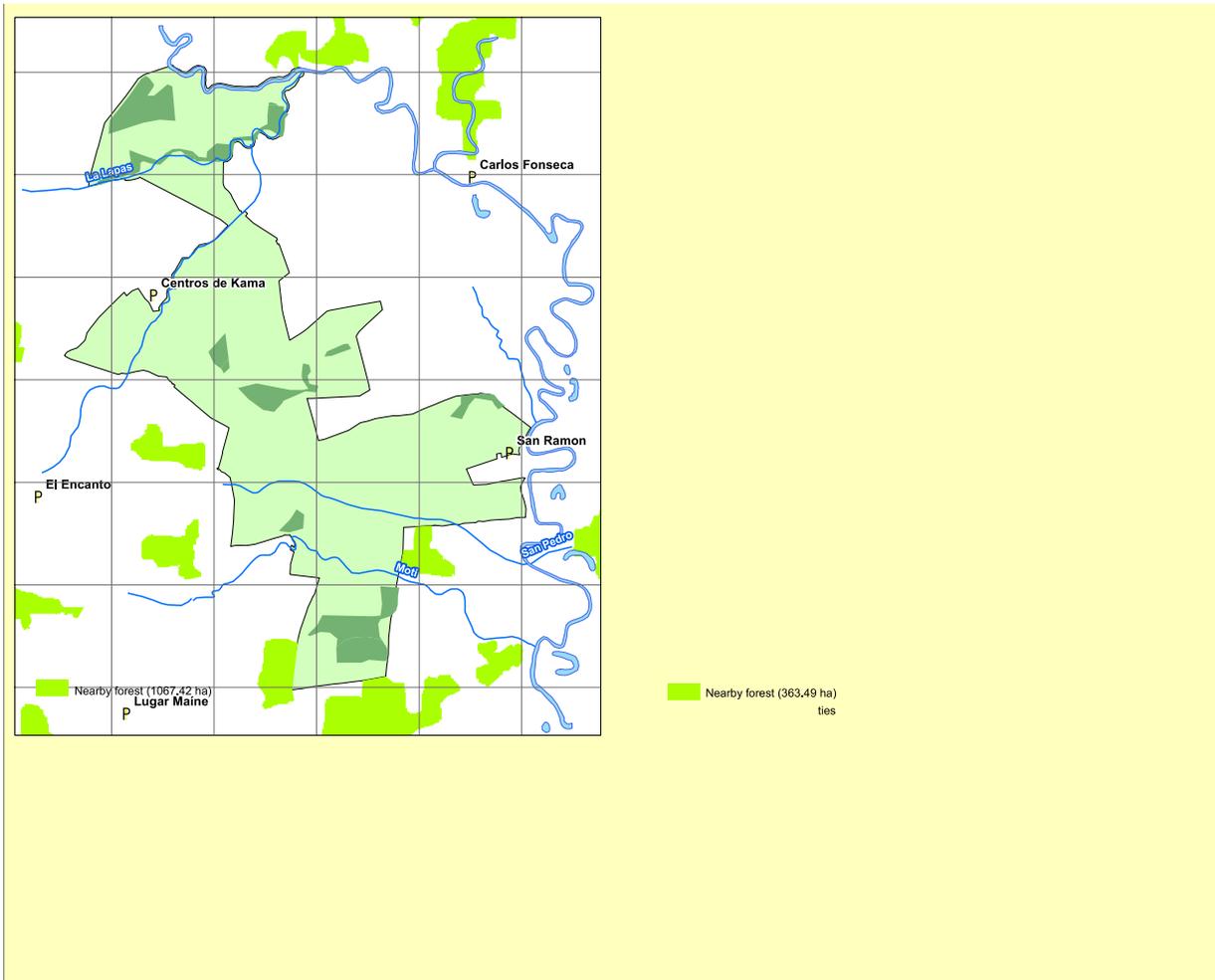
**Figure 12 Current carbon stocks in project areas**



G1.5 A description of communities located in the project zone, including basic socio-economic and cultural information that describes the social, economic and cultural diversity within communities (wealth, gender, age, ethnicity), identifies groups such as Indigenous Peoples and describes any community characteristics.

The proposed project areas, as defined by the project boundaries in section G1.3, are privately owned land, and there are no communities living within the project areas. However, communities do live within in the direct and indirect influence areas of the project zone. The entire project area includes such areas of influence, as defined below.

**Figure 10 Map of Project Boundaries and Area of Influence**



The nearest town is that of El Rama with a population of over 50,000 people, around 90% of which are considered to be poor.

**Table 1 Population Statistics for El Rama Municipality**

Total Population	52,482
Men:	26,650
- Under 15 years old	12,143
- Over 15 years old	14,507
Women:	25,832
- Under 15 years old	11,437
- Over 15 years old	14,395
Holding a permanent job:	
- Men	8,589
- Women	1,953
Holding a temporary job:	
- Men	3,822
- Women	713
Source: INIDO (2008)	

As is the case in the whole of the Atlantic Coast region, the population consists of a mix of people with different origins, including Native American, Spanish, North European, African and Asian.

The major ethnic groups are:

- Los Miskitos
- Los Ramas
- Creoles
- Mestizo-Spanish from the Pacific coast
- Chinese

Literacy levels are low (around 60% illiterate according to a study done by INIDO in 2008).

### **The Rama People**

The Rama Indians are an indigenous population who historically inhabited the area from the eastern shore of Lake Nicaragua to the Atlantic coast, and south into the Costa Rican foothills. However today Rama territory lies almost entirely within the administrative boundaries of the RAAS, and the Rama elect two representatives to the RAAS Regional Council. The Rama are the only living representatives of

the truly aboriginal people of south eastern Nicaragua.

The main Rama settlements today are on the small island of Rama Cay, in the southern part of Bluefield's Lagoon. Smaller populations exist on the mainland, consisting of scattered settlements with small agricultural plots. Rama communities are self-governed by Community Directive Boards, with a president, vice president, treasurer and other positions that are elected by community members. However, although the Rama economy has been monetized, the social order is traditionally egalitarian, which at the village level is still without a central figure and sustained by a system of mutual help and cooperation.

The Rama describe the current situation within the region as a 'dearth of paid employment' and give reasons including the boom and bust economy of the Atlantic coast, and the marginalization of Rama communities as reasons behind their levels of poverty.

**Table 2 Poverty Levels in El Rama Municipality (UNIDO 2008)**

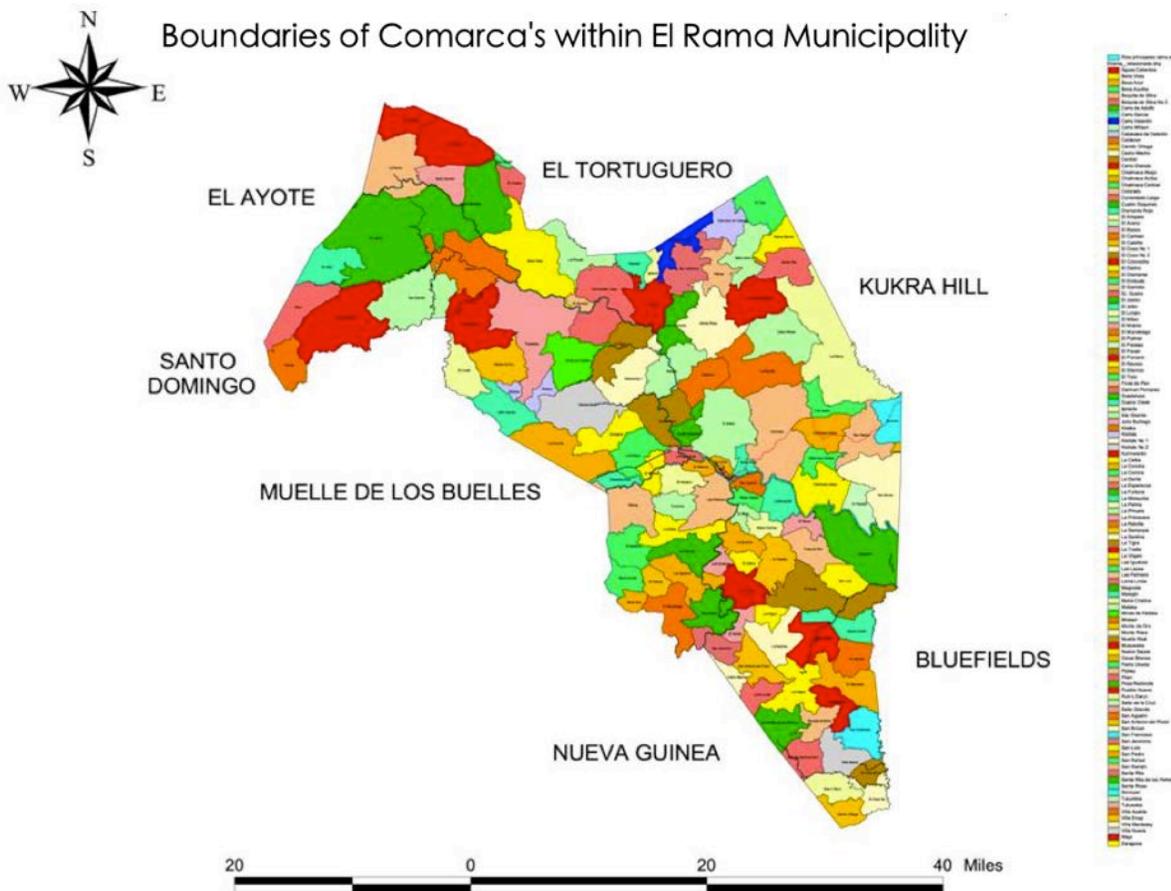
<b>Not poor</b>	<b>Moderately poor</b>	<b>Extremely poor</b>
12%	28%	60%

Within Nicaragua, the next level down from a municipality is the local administrative division known as a Comarca. The Comarca nearest the Rio Siquia plantation is called Comarca Calderon, located within 1km of the entry to the farm on the Rama - Wapi road and 13km from El Rama town. The majority of its population have been living in the community for over 20 years and are landowners of their residential properties. The average household in Calderon consists of 3 to 5 members, and the vast majority (83%) of the houses are built with timber and roofs made of zinc. The main source of water supply comes from local wells although a large part of the population also use the river as an alternative. Calderon is mostly a male dominated community with extremely high levels of illiteracy and unemployment. 47% of the residents earn their living as agricultural producers, while field workers make up 43% of the occupations in the area.

The closest Comarca to the Rio Kama plantation is called La Fonseca, located Just 4 km from the project and 39 km from Rama. Households in La Fonseca consist of an average of 5 members. Just like Calderon, most of the houses are built with timber and roof made of zinc where residents are landowners of their residential properties. The main source of water supply comes from local wells although a large part of the population also use the river as an alternative. The largest job occupation within this community is

Agricultural producers (32%) followed by field workers (26%). La Fonseca like many surrounding communities suffer from extreme poverty mostly caused by lack of jobs and a high illiteracy rate

**Figure 13 Distributions of Comarcas within El Rama Municipality**



Employment and benefits of the project activities are prioritized within Comarca Calderon and Comarca La Fonseca. Similarly, as additional areas are added to the project area, direct and indirect benefits will be targeted locally, at those communities in closest proximity.

There are currently a number of Non Government Organizations (NGOs) working on the socio-economic development of the Rama area. These include:

- PROTIERRA (World Bank, MARENA, INIFOM)
- PRODES (Dutch gov, Nica gov)
- GIZ

G1.6 A description of current land use and customary and legal property rights including community property in the project zone, identifying any ongoing or unresolved conflicts or disputes and identifying and describing any disputes over land tenure that were resolved during the last ten years (See also G5).

EcoPlanet Bamboo has strict policies on the acquisition of land for project activities. This includes legal due diligence to ensure that there have not been any conflict or disputes over the land within the last decade, acquisition only from private large scale landowners (and not smallholders or community tenured land). Prior to acquisition all land owners were large scale commercial owners, whom were unable to make the land economically feasible, and so wanted to sell. As such all of the project areas have clean title, and are currently legally owned by the project proponents.

As is typical of most rainforest regions, the soils of Nicaragua's Caribbean Coast are thin and nutrient poor, and cannot sustain intensive agriculture for long periods following deforestation. Traditionally areas were cleared for shifting agriculture, leaving the top soil exposed and open to erosion during the rainy season, leaching the soil and further exacerbating the problem. The proposed project land is predominantly degraded pastureland with scattered trees. Prior to the project activities it was used for low intensity cattle grazing.

G1.7 A description of current biodiversity in the project area (diversity of species and ecosystems) and threats to that biodiversity, using appropriate methodologies substantiated where possible with appropriate reference material.

Deforestation, land use change and subsequent loss of biodiversity in the RAAS has been extreme over the past decades. The figure below shows the progressive deforestation since 1983. The majority of remaining forestland now occurs within the protected areas contained within the San Juan Biosphere Reserve, but continues to face pressure.

**Figure 14 Nicaragua Forest Cover in 1983, 2000 and 2010**



During the 1990's and early 2000's forestland in Nicaragua was cleared at a rate of about 150,000–200,000 ha per year. Fuelwood extraction and commercial logging are factors behind this trend, but the dominant driving force has traditionally been the advance of the agricultural frontier. The most common activity is slash and burn for intensive grain production. The soils of the Atlantic coast cannot support extended periods of intense agriculture, and the land is subsequently abandoned and used as low productivity grazing land, with marginal commercial value. The land has little chance of recovery.

The municipality of El Rama shares two protected areas with neighbouring municipalities: La Reserva Natural de Cerro Silva and La Reserva Natural de Wawashang. As part of the RAAS, the municipality is also part of the Atlantic Biological Corridor project, which is a World Bank / Global Environmental Facility sponsored project to promote the conservation and sustainable use of biological resources in the region.

Terrestrial fauna has also decreased in variety and abundance due to the unsustainable exploitation of natural resources in the area.

EcoPlanet Bamboo initiated an Environmental Impact Assessment, which provided information on current biodiversity in the project areas. Full results of these surveys can be found in Section B and the relevant sections of GL, as well as in Annex A.

G1.8. An evaluation of whether the project zone includes any High Conservation Values (HCVs) and a

EcoPlanet Bamboo employed the services of a specialist firm to carry out an Environmental Impact Assessment of the project areas in May 2011. As part of this EIA, an assessment took place of current ecosystems and species.

The project zone, as defined in section G1.3, contains high conservation value forests, identified by the presence of rare and endangered species, under international classifications. These areas are unfortunately limited and have low connectivity, but are outside of the direct project activities. Therefore it is expected that the project activities, through the development of functioning, closed canopy bamboo forests, will have a positive impact on the maintenance and expansion of these HCVs.

- Rio Siquia's Farm contains 40 hectares of HCV forest.
- Rio Kama's Farm contains 89 hectares of HCV forest.

The current land use map above identifies the exact boundaries and locations of these small patches of HCV forest, containing the below endangered species. Further details of the qualifying attributes can be found in Section B below.

There are a number of rare or threatened species that can be found in the Rama area:

- Richmond's Squirrel (*Sciurus Richmondi*) one of the most threatened neotropical squirrel
- Tapir (*Tapirus bairdii*)
- Golden-mantled Howling Monkey (*Alouata palliate*)
- White-faced Monkey (*Cebus capucinus*)
- Guardatinaja (*Agouti paca*)
- White-tailed deer (*Odocoileus virginianus*)

From the project area maps defined in G1.5 above, it can be seen that there are small remnant patches of remaining forest within this boundary that still exhibit high conservation value elements. However, these areas are small, and without the project activities, would most likely have been lost or converted to grazing land within the foreseeable future.

## G2. BASELINE PROJECTIONS

---

*A baseline projection is a description of expected conditions in the project zone in the absence of project activities. The project impacts will be measured against this 'without-project' reference scenario.*

G2.1 Description of the most likely land-use scenario in the absence of the project, following the IPCC 2006 AFOLU guidelines or a more detailed methodology, describing the range of potential land-use scenarios and the associated drivers of GHG emissions, and justifying why the land-use scenario selected is most likely.

Economic activity in El Rama is mostly limited to subsistence cattle farming and agriculture using basic technology, with some traditional forest plantations present and an expanding presence and spread of commercial oil palm plantations. There is no industrial development and little support infrastructure such as distribution, banking services, roads, electricity and telecommunication. At the same time the municipality is faced with a fast growing rural population, both internally and due to migration from the Pacific coast, which has resulted in widespread poverty and high levels of unemployment. In addition, natural resources such as forests and biodiversity are degraded.

Promoting the cultivation of perennial crops has been identified as one strategic focus by local government, not only to support economic development but also ecological regeneration, however due to the political history of Nicaragua and the inaccessibility of the Atlantic coast, foreign investments for such development is lacking.

Furthermore, the extremely degraded status of the land, as evidenced through the CDM AR Tool for the Identification of Degraded and Degrading Lands suggests that the most likely land use scenario in the absence of the project is a continued state of increasing forest and soil degradation due to cattle farming.

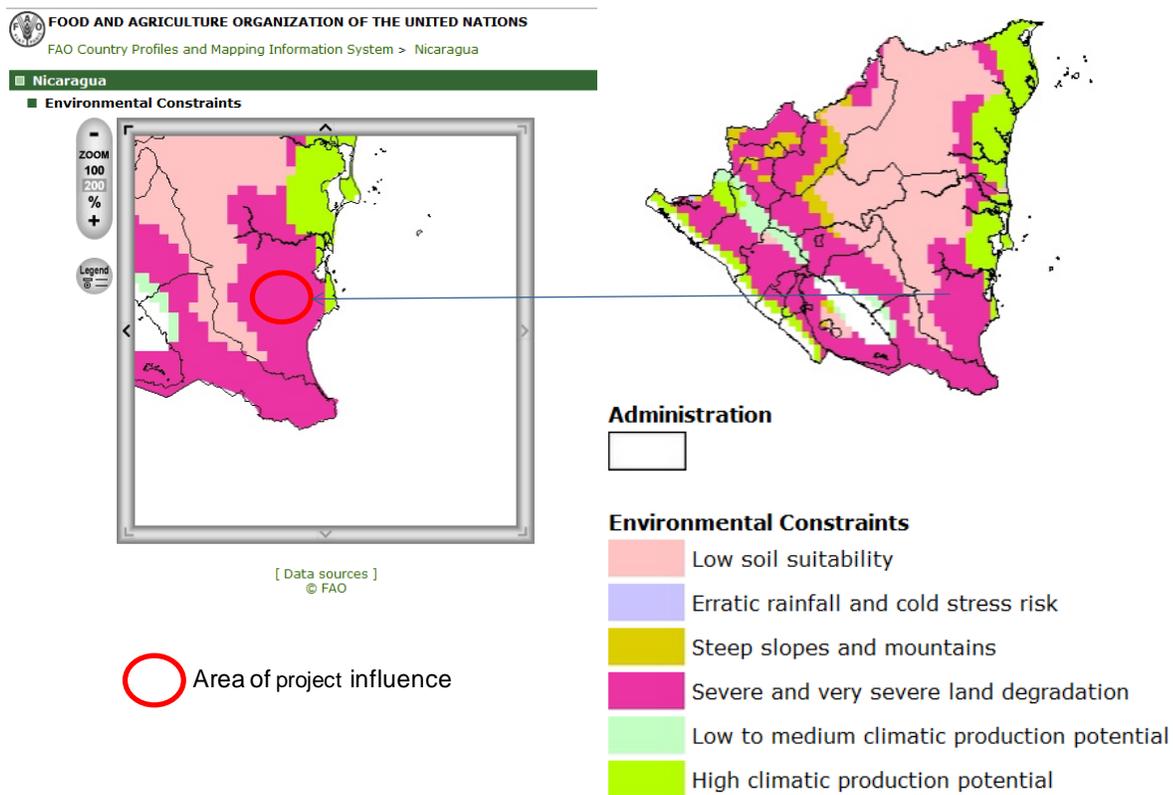
### **Evidences of land degradation within the project boundary area: From global studies**

Studies carried out at global level which use different approaches to define the degree of degradation, have defined the area of project influence as degraded. Evidence is shown by the FAO throughout the

Country Profiles and Mapping Information System, where, according to the map of major environmental constraints, the project boundary area is included within the category of severe and very severe land degradation.

In addition, Oldeman et al. (1991), with the project Global Assessment of Soil Degradation (GLASOD), evaluate levels of soil degradation in 21 regions around the world with teams of scientific soil researchers. In this project, an approach was standardised and applied which considered the two major types of soil degradation, erosion (water and wind) and internal soil physical and chemical deterioration. Within the types of soil degradation were also some categories defined according to the specific process and the level (degree) of severity. As a result a map of these 21 world regions was created, which includes a quantification of soil degradation based on the factors above and their categories.

**Figure 15 Project location according to Major Environmental Constraints**



The above figure uses data from - Major Environmental Constraints for Agricultural Production Project -

based on FAOCLIM database, ARTEMIS NDVI imagery, and soil and terrain data provided by Soil Resources Management and Conservation Service. FAO-GIS. Prepared using Windisp software by Rene Gomme, Environment and Natural Resources Service, for the SOFI 1999 Report. <http://www.fao.org/countryprofiles/Maps/NIC/04/ec/index.html>

When the project boundary area is located within the units generated by the GLASOD project, the areas correspond to a unit defined as highly degraded. The degradation in this case is related to the loss of topsoil through water erosion, which is indicated in the map as “Wt” and with the loss of nutrients and/or organic matter indicated as “Cn”. Causes are related to physical human intervention such as deforestation, the removal of the natural vegetation and agricultural activities, processes indicated in the map legend as “f”.

As the topsoil is normally rich in nutrients, a relatively large proportion of nutrients are lost together with the topsoil. This process may lead to an impoverishment of the soil. Loss of topsoil itself is often preceded by compaction and/ or crusting, causing a decrease in the infiltration capacity of the soil, and leading to accelerated run-off and soil erosion. The degree of degradation is defined as 3 or strong, indicating that the terrain is non reclaimable at the farm level. Major engineering works are required for terrain restoration and original biotic functions are largely destroyed (Oldeman et al. 1991).

Degradation due to the loss of nutrients and/or organic matter (Cn), occurs if agriculture is practised on poor or moderately fertile soils, without an adequate application of fertilizer. Additionally the rapid loss of organic matter after clearing of natural vegetation is also included in this type of soil degradation (Oldeman et al. 1991).

The degree for this type of degradation is moderate. That means the terrain has a greatly reduced agricultural productivity but is still suitable for use in local farming systems. Major improvements are required to restore productivity. Original biotic functions are partially destroyed (Oldeman et al. 1991). The figure below shows the GLASOD map and the respective table of attributes, which define the level of degradation.

**Figure 16 Land degradation according to the Global Assessment of Soil Degradation**



**DEGRADATION SEVERITY (Extent + Degree)**

Water erosion	Wind erosion	Chemical deterioration	Physical deterioration
<ul style="list-style-type: none"> <li>- Loss of topsoil</li> <li>- Terrain deformation/ mass movement</li> </ul>	<ul style="list-style-type: none"> <li>- Loss of topsoil</li> <li>- Terrain deformation</li> <li>- Overblowing</li> </ul>	<ul style="list-style-type: none"> <li>- Loss of nutrients/ organic matter</li> <li>- Salinization/alkalinization</li> <li>- Acidification</li> <li>- Pollution</li> </ul>	<ul style="list-style-type: none"> <li>- Compaction/crusting</li> <li>- Waterlogging</li> <li>- Subsidence of organic soil</li> </ul>
<ul style="list-style-type: none"> <li>Low</li> <li>Medium</li> <li>High</li> <li>Very high</li> </ul>	<ul style="list-style-type: none"> <li>Low</li> <li>Medium</li> <li>High</li> <li>Very high</li> </ul>	<ul style="list-style-type: none"> <li>Low</li> <li>Medium</li> <li>High</li> <li>Very high</li> </ul>	<ul style="list-style-type: none"> <li>Low</li> <li>Medium</li> <li>High</li> <li>Very high</li> </ul>

Source: Oldeman et al. (1991). The map with more details can be seen in the follow link:  
[http://www.isric.org/sites/default/files/glasod\\_mercator1000.jpg](http://www.isric.org/sites/default/files/glasod_mercator1000.jpg)

**Direct evidence of land degradation within the project boundary area**

As was described above, the degradation within the project boundary area is associated with chemical deterioration of soils and the effects of water erosion. In order to elucidate the soil properties in the study area, some chemical and physical properties of soils were evaluated within the two farms (Kama

and Siquia). A total of 30 soil samples from Kama farm and 21 from Siquia farm were randomly collected and thereafter analysed in the Soil and Water lab of the Universidad Nacional Agraria (Managua, Nicaragua).

The soil properties found for both farms confirm problems of acidity and according to pH values these soils can be defined as extremely acid. In this sense values of pH lesser than 5 and total bases lesser than 5 meq /100g, correspond to two of the four criteria defined by Bertsch (1995) to identify soils with acidity problems in the tropics.

**Table 3 Values of some chemical soil properties in Kama and Siquia farm. Project boundary area.**

Property	Kama	Siquia
pH	4,5 (SD= 0,29)	4,7 (SD =0,20)
Organic matter (%)	3,3 (SD =1,73)	2,2 (SD =0,39)
Organic carbon	1,9 (SD =1,01)	1,3 (SD =0,22)
N (%)	0,2 (SD =0,09)	0,1 (SD =0,02)
P (ppm)	0,6 (SD =0,75)	0,4 (SD =0,46)
K (meq / 100 g of soil)	0,2 (SD =0,23)	0,1 (SD =0,06)
Ca (meq / 100 g of soil)	1,4 (SD =0,95)	2,8 (SD =1,55)
Mg (meq / 100 g of soil)	0,6 (SD =0,35)	1,5 (SD =0,73)
Na (meq / 100 g of soil)	0,6 (SD =0,67)	0,4 (SD =0,16)
Total bases (meq / 100 g of soil)	2,8 (SD =1,33)	4,7 (SD =2,36)
Fe (ppm)	39,0 (SD=19,8)	54,4 (SD=36,75)
Mn (ppm)	69,6 (SD=20,44)	61,9 (SD=33,78)

SD= standard deviation

Exchangeable acidity and Al were not determined; however there are enough evidences of soil deterioration associated with acidity. The content of Fe and Mn are over the critical level (10 and 5 ppm, respectively) and both elements might generate problems such as P fixation by Fe or toxicity by Mn (Bertsch 1995; Fassbender & Bornemisza 1994).

Most of the soils of the project boundary area belong to the Ultisols order (Nicabamboo 2011a and Nicabamboo 2011b). Soils of this order usually have acidity problems because of the evolution characteristics (Sanchez 1981), however forest deforestation and the subsequent establishment of

agriculture or cattle farming contribute with their deterioration.

In general, values of organic matter lesser than 2% and organic carbon lesser than 1.2% are defined as very low (Fassbender & Bornemisza 1994). Even for Ultisols located in tropical countries Sanchez (1981) registered values between 2 and 4,9 % within the first 20 cm of depth, which are higher than those values found in the project boundary area.

Low content of organic matter has been considered as one of the indicators of soil degradation (i.e. FAO 2002; Oldeman et al., 1991), which is associated with the deterioration of chemical and physical soil properties. As a result, the productivity capacity abruptly declines and a low fertility and a high susceptibility to erosion start to be evident.

Another physical soil property was directly assessed in order to provide evidences of soil degradation. The penetration resistance of soils was measured within sample plots using an Eijkelkamp penetrometer. Three measurements per sample plot were carried out, 5 cm to 45 cm of depth. Classes of penetration resistance of soils were defined according to the soil survey manual of the Soil Conservation Service, U.S., Department of Agriculture, Handbook 18 (1993).

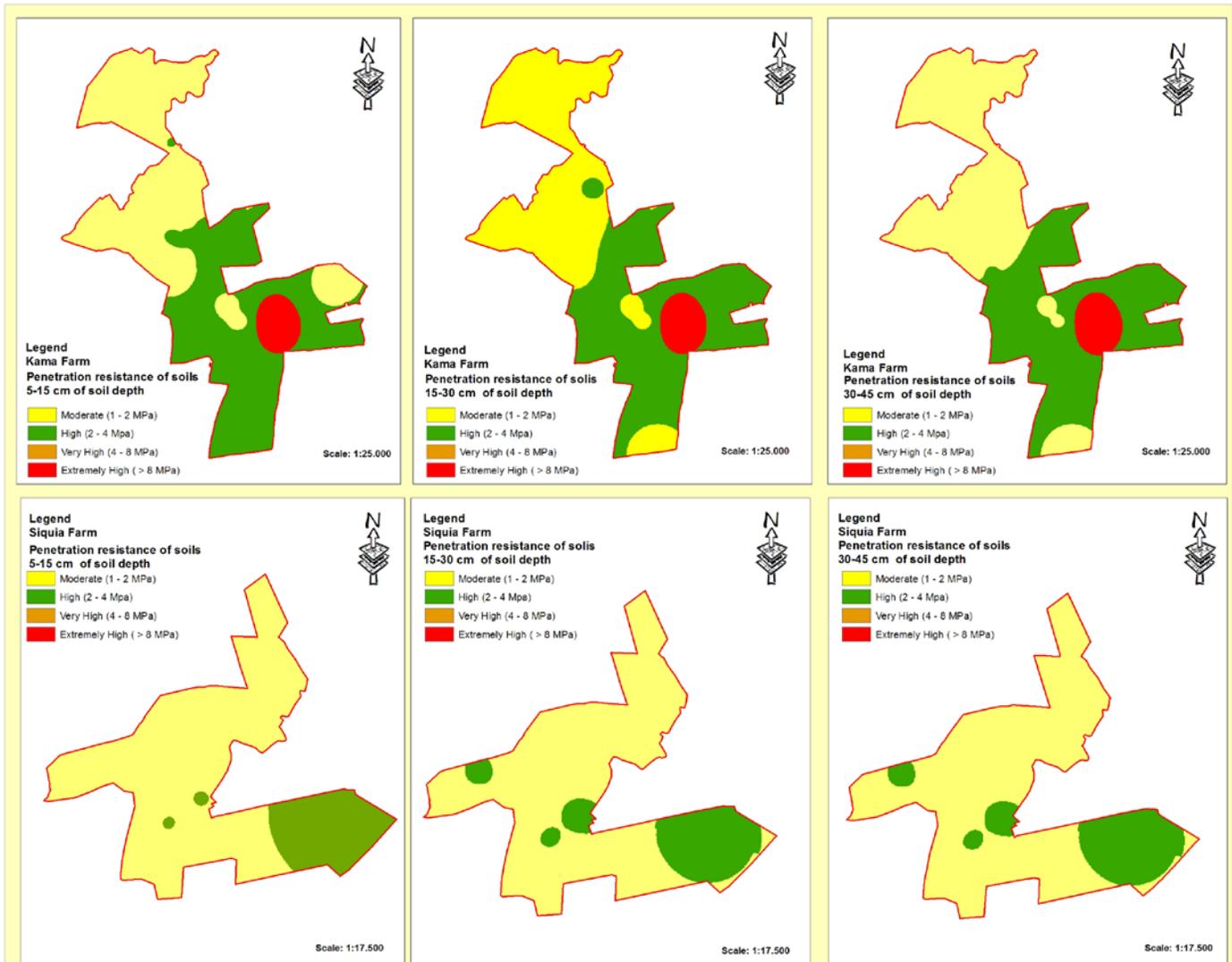
This soil property may be used as indicator of degradation, which also represents the loss of productivity capacity and the deterioration of physical properties. If penetration resistance of soils is high the conditions of rooting are constrained as well as the roots effective depth (Dossman et al, 2010). Therefore with values higher than 3 MPa the optimal development of roots is highly limited (De Leon 1995; Reichert et al 2009).

A map of the penetration resistance of soils within the project areas was generated from the information collected in the sampling. Average values per plot were extrapolated using the method of inverse distance weighted (IDW). This approach is based on the assumption that the interpolating surface should be most influenced by the nearby points. The interpolating surface is a weighted average of the scatter points and the weight assigned to each scatter point decreases as the distance increases to the interpolation point. This process was performed with the spatial analysis extension in Arc Map GIS software, with a cell size of 8x8 meter.

Although the values of classes defined for the penetration resistance of soils by USDA (1993), start with values lesser 0.1MPa, the values registered in both farms are higher than 1 MPa and most of the project

boundary area might be considered limited according to this soil property.

**Figure 17 Penetration resistance of soil within the project boundary**



Given the low economic development in the area, and the lack of infrastructure, human assisted regeneration of the project areas is unlikely and therefore the most likely land-use scenario remains the historic land-use of unsophisticated, low intensity cattle farming or unused shrubland.

G2.2 Document that project benefits would not have occurred in the absence of the project, explaining how existing laws or regulations would likely affect land use and justifying that the benefits being claimed by the project are 'additional' and would be unlikely to occur without the project.

Economic development in the RAAS and El Rama is low, with high levels of poverty and unemployment. At the same time barriers to investment in the area are high:

- Country risk for Nicaragua
- Lack of infrastructure in the RAAS
- Lack of access to credit for small and medium enterprises
- Lack of human capital, as skills development is low in the area
- Lack of processing facilities for bamboo mean that it's use remains solely for unprocessed local construction
- Project team that covers forestry and financial expertise as well as experience working in remote areas, new markets and species and has a high tolerance for risk

All of these factors mean that economic development is unlikely to occur unless external actors intervene.

One of the major obstacles that EcoPlanet Bamboo has faced in raising seed capital for the project is concern over political risk for Nicaragua. EcoPlanet Bamboo has overcome these barriers and concerns due to the successful experience of the project proponents within the region, the close community connections and trust within the Rama population, the expertise of its staff and its ability to combine carbon finance with international investment.

Policies within the area do not protect remaining forest cover outside of surrounding protected areas, and even within such areas deforestation and forest degradation due to illegal activities continues. Land outside of protected areas is under private ownership, and there are no laws or policies governing the maintenance or restoration of forest cover. As such, economic incentives for landowners without access to capital lead to the pre-project scenario of subsistence farming and low intensity cattle grazing until the land cannot support this, and it is left fallow.

G2.3 Calculate the estimate carbon stock changes associated with the 'without project' land-use scenario described above. This requires estimation of carbon stocks for each land use class of concern, and a definition of the carbon pools included. The timeframe can be either project lifetime, or the project GHG accounting period, whichever is more appropriate.

Estimate the net changes in the emissions of non-CO2 greenhouse gas (GHG) emissions such as CH4 or N2O in the 'without project' scenario. Non CO2 gases must be included if they are likely to account for more than 5% of project's overall GHG impact over each monitoring period.

Description of how the "without-project" scenario would affect communities in the w including the impact of likely changes in water, soil and other locally important ecosystem services.

The historical trend has been one of decreasing forest cover, and increased degradation of remaining areas. The use of the CDM Tool for the Identification of Degraded and Degrading Lands has shown that the project zone is highly degraded and is unlikely to change this current trend without human intervention. The project zone is defined in section G1.3.

As such the baseline scenario has been chosen from paragraph 22 of the A/R modalities and procedures is "a" which is defined as "Existing or historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary". As the existing or historical change in carbon stock, for both above and below ground biomass is decreasing, it is conservative to assume a zero carbon stock change in the 'without project' scenario.

There are no non CO2 emissions associated with either the project or the without project scenario.

Continual soil erosion and loss of biological value negatively affects the ability of an ecosystem as a whole to function. The proposed project areas have increased ecological value due to its border with the Rio Escondido, one of the major waterways in the RAAS. Continued land clearance and subsequent degradation leads to increased erosion and therefore sedimentation of waterways, which has negative implications for ecosystem services within the area.

In the without project scenario communities in Calderon, La Fonesca and surrounding communities face little option for economic diversification, and therefore are expected to continue in the current

trend of increasing poverty, and increasing pressure on surrounding protected areas.

G2.4 Description of how the “without-project” land-use scenario would affect biodiversity in the project zone (e.g. habitat availability, landscape connectivity and threatened species).

Under the “without project” scenario, the project areas are expected to degrade further, as the cycle of slash-and-burn, followed by low productivity cattle grazing and leaving the land unmanaged for a few years continues. The project areas are defined by the boundaries of the project zone as stated in section G1.3.

Although there is little biological value within the pre-project scenario, in the wider area of the project zone, a lack of economic diversification will continue to put pressure on existing forest land and protected areas, which will continue to suffer increased levels of deforestation and degradation and therefore associated loss of biodiversity. Already fragmented areas of remaining forest will become scarcer, until the ecosystem fails to be able to function, and the biodiversity maintained within this fragmented landscape lost. Already endangered and threatened species will come under greater pressure, or be lost from the area entirely. Compared with the original levels of biodiversity for the original tropical forest ecosystem type, the baseline biodiversity levels are low.

The project area maps in G1.5 indicate a few remnant patches of forest cover. In the without project scenario, following the evidenced trend of increasing forest degradation and conversion to grazing land, these areas would likely follow the same pattern of negative land use change.

A full baseline biodiversity assessment has been carried out, with the results available in Annex A.

### **G3. PROJECT DESIGN & GOALS**

---

*The project must be described in sufficient detail so that a third-party can adequately evaluate it. Projects must be designed to minimize risks to the expected climate, community and biodiversity benefits, and to maintain those benefits beyond the life of the project. Effective local participation in project design and implementation is key to optimizing multiple benefits, equitably and sustainably.*

*Projects that operate in a transparent manner build confidence with stakeholders and outside parties and enable them to contribute more effectively to the project.*

### G3.1 Provide a summary of the major climate, community and biodiversity objectives.

The overall goal of the proposed project activity is to achieve the sustainable development, management and commercialization of a bamboo plantation in the Rama region, supporting economic and social development within the area and developing the market for bamboo as an alternative to timber traditionally harvested from natural forests.

Based on “a triple-bottom-line” approach, the objectives of EcoPlanet Bamboo are threefold:

- To develop sustainable and commercially viable plantations of bamboo in an indigenous environment close to its largest export market;
- To provide sustainable jobs and economic vitality in a region where the company founders have long had a philanthropic interest;
- To help combat deforestation and climate change by reducing dependence on unsustainable tree species and by using one of the planet’s most effective forms of natural carbon sequestration.

This approach translates into climate, community and biodiversity objectives as follows:

#### **Climate objectives:**

- Bamboo’s fast growth enables it to sequester significant quantities of carbon dioxide (CO<sub>2</sub>) in a relatively short time period. The significant sequestration of the species within the first 6-7yr period provides a source of finance through achieving these climate objectives, prior to the project becoming financially viable.
- EcoPlanet Bamboo intends to harvest culms to be utilized in long term wood products (such as flooring, decking, construction etc.) storing sequestered carbon is stored indefinitely.

- The harvesting of selective culms does not kill the tree but rather stimulates further growth and therefore further sequestration, not only above ground but also below ground in the intricate rhizome system, and through increased soil carbon levels. Thus some of the permanence issues associated with traditional sequestration projects are overcome, and the climatic benefits higher
- 20 - 25% of global greenhouse gas emissions currently come from land use change - in particular deforestation and degradation. EcoPlanet Bamboo is growing *Guadua aculeata* for high-end markets that traditionally rely on species harvested from natural forests, therefore contributing to such deforestation, as well as the continued trend towards endangered status for many of these species. The proposed project activity will therefore not only have high sequestration benefits, but will indirectly (and not to be accounted for) reduce greenhouse gas emissions from deforestation and degradation of natural forests.
- Once harvesting begins, EcoPlanet Bamboo will utilize the waste products for the creation of green charcoal. This will provide a sustainable resource in an area that is almost entirely dependent on fuel wood and charcoal from natural forests.

In this manner, the development of sustainable plantations of timber bamboo have the potential to contribute significantly to international climate goals.

**Community objectives:**

- The proposed project, once fully realized will support economic development in the El Rama region. Direct employment will occur (seasonal and permanent) within the project activities. If capital is sourced, EcoPlanet Bamboo aims to invest in the necessary infrastructure and processing facilities to carry out as much value added processing of its bamboo as possible. In this manner, livelihood diversification and economic development will be maximized.
- Increase environmental awareness through good environmental management practices
- EcoPlanet Bamboo is committed to dedicating a minimum of 50% of carbon finance to community based development activities within the areas surrounding the proposed project activities. A joint

stakeholder committee will be created from members of the community (including regional representatives, women and youth groups) to decide upon the priorities for use of this fund.

**Biodiversity objectives:**

- EcoPlanet Bamboo will only utilize degraded land that was cleared more than ten years prior to the project start date. Land to be planted is degraded pastureland. All trees within these pastures are left standing, resulting in approximately 20% of the revegetation areas being non-bamboo.
- The development of fully functioning bamboo ecosystems provides a forest canopy that can support many of the species currently under pressure from habitat fragmentation.
- EcoPlanet Bamboo is committed to maintaining conservation areas within its plantations. Any areas of existing forest will be maintained, and areas not suitable for planting *Guadua* will be planted with native species to encourage habitat patches and biological corridors.
- No use of invasive species as *Guadua* has been naturalised in Nicaragua for many years
- Degraded soil is regenerated through planting with bamboo, enabling increased levels of biodiversity at the soil and litter level. EcoPlanet Bamboo will build on research already carried out by INBAR to quantify such benefits.
- Whilst the conversion of natural forests to monocultures of bamboo is not recommended, INBAR has carried out significant research to show that the use of bamboo plantations have been successful in rehabilitating degraded land, and that allowing some undergrowth can have positive effects not only on bamboo productivity but on biodiversity. INBAR has shown that bamboo plantations have been used successfully to rehabilitate degraded land back in to productive fully functioning ecological systems - advantageous for biodiversity in comparison to the baseline land use of cattle ranching.
- Provision of sustainable livelihoods within the region, both directly through employment opportunities and indirectly through the utilization of carbon finance for economic development within the area, will result in a decreased dependence upon the unsustainable harvesting of

G3.2 Describe each project activity with expected climate, community and biodiversity impacts and its relevance to achieving the project’s objectives.

An overview of the project activities directly associated with the development of sustainable, FSC certified plantations of *Guadua aculeata* is given below.

**Table 4 Major project activities**

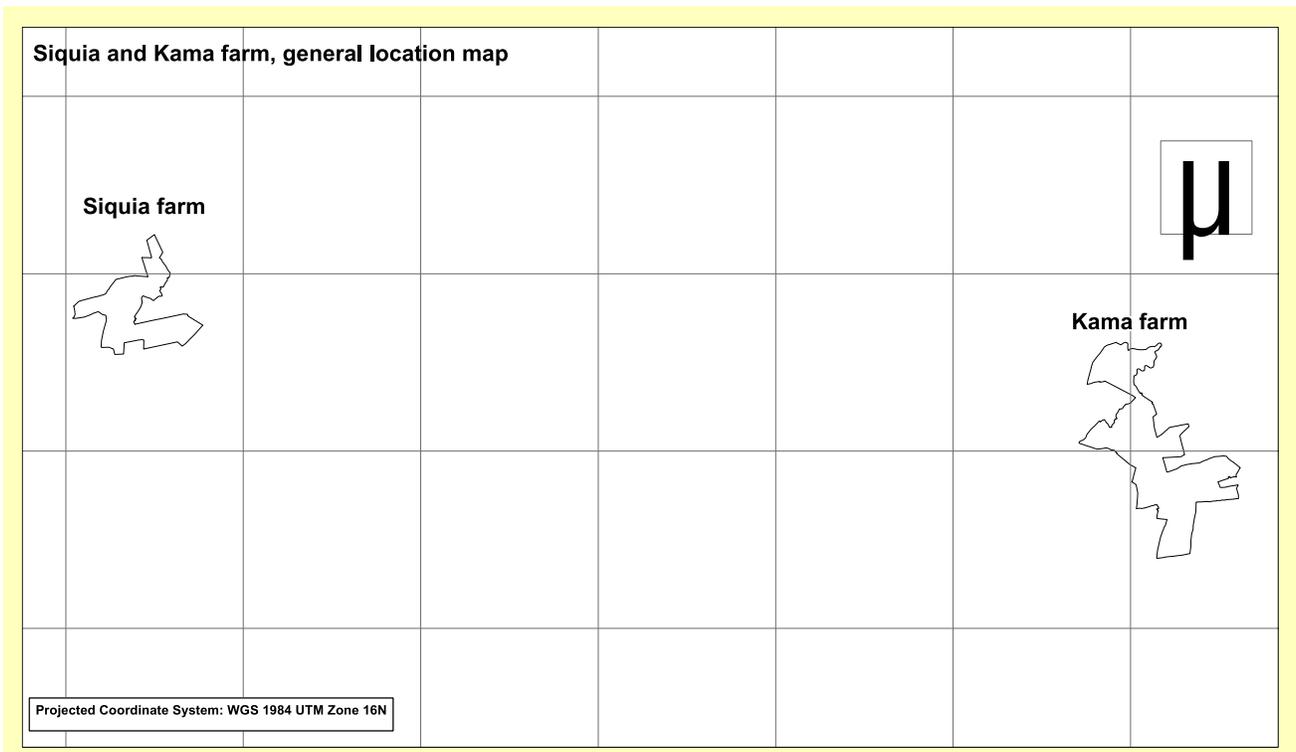
Project Activity	Impacts and Relevance
Nursery development	All seed and planting material was purchased from indigenous communities in El Cua. <ul style="list-style-type: none"> <li>• Employment of nursery staff with a focus on women</li> <li>• Development of a seed bank for current and future plantations, enabling EcoPlanet Bamboo to also carry out valuable research in to <i>Guadua aculeata</i></li> </ul>
EIA and baseline studies	<ul style="list-style-type: none"> <li>• Full biodiversity assessment and baseline analysis for carbon and environmental impacts</li> <li>• Development of project design to maximize biodiversity benefits</li> <li>• Development of mitigation plans against identified risks</li> </ul>
Land preparation	<ul style="list-style-type: none"> <li>• High number of temporary workers employed, providing revenue to communities where paid employment is scarce</li> <li>• Land preparation undertaken to maximize carbon benefits (manual preparation)</li> </ul>
Planting	<ul style="list-style-type: none"> <li>• High number of temporary workers employed, providing revenue to communities where paid employment is scarce</li> <li>• Conversion of degraded pasture land in to a full functioning bamboo ecosystem</li> <li>• Increase in biodiversity</li> <li>• Reduction in deforestation of surrounding forests</li> <li>• Provision of a sustainable alternative to native hardwoods for western markets</li> </ul>
Maintenance and monitoring	<ul style="list-style-type: none"> <li>• Training of a permanent team</li> <li>• Maximization of biological growth</li> <li>• Maintenance of conservation areas</li> <li>• Adaptive management enables a continual learning process to maximize carbon, social and environmental benefits</li> </ul>

Once carbon finance has been acquired, a portion of this finance will be used to develop an outgrower scheme for the harvesting of natural culms from the surrounding areas, based of a selective harvesting system. This indirect project activity will not only generate further jobs and economic revenue for smallholder farmers who still tend their own land but have no real way to generate income, but will also ensure the longevity of the project, by building up experience and manufacturing capacity in preparation for harvesting of the project’s own bamboo.

Carbon finance will also be utilized from Year 7 onwards to develop small and medium bamboo based enterprises within the communities. Such enterprises (local furniture, tiling, handicrafts, etc.) cannot provide investor returns and therefore cannot utilize investor finance, but can provide considerable income for these communities.

G3.3 Provide a map identifying the project location and boundaries of the projects area(s), where the major project activities will occur, of the project zone and of additional surrounding locations that are predicted to be impacted by project activities (through leakage).

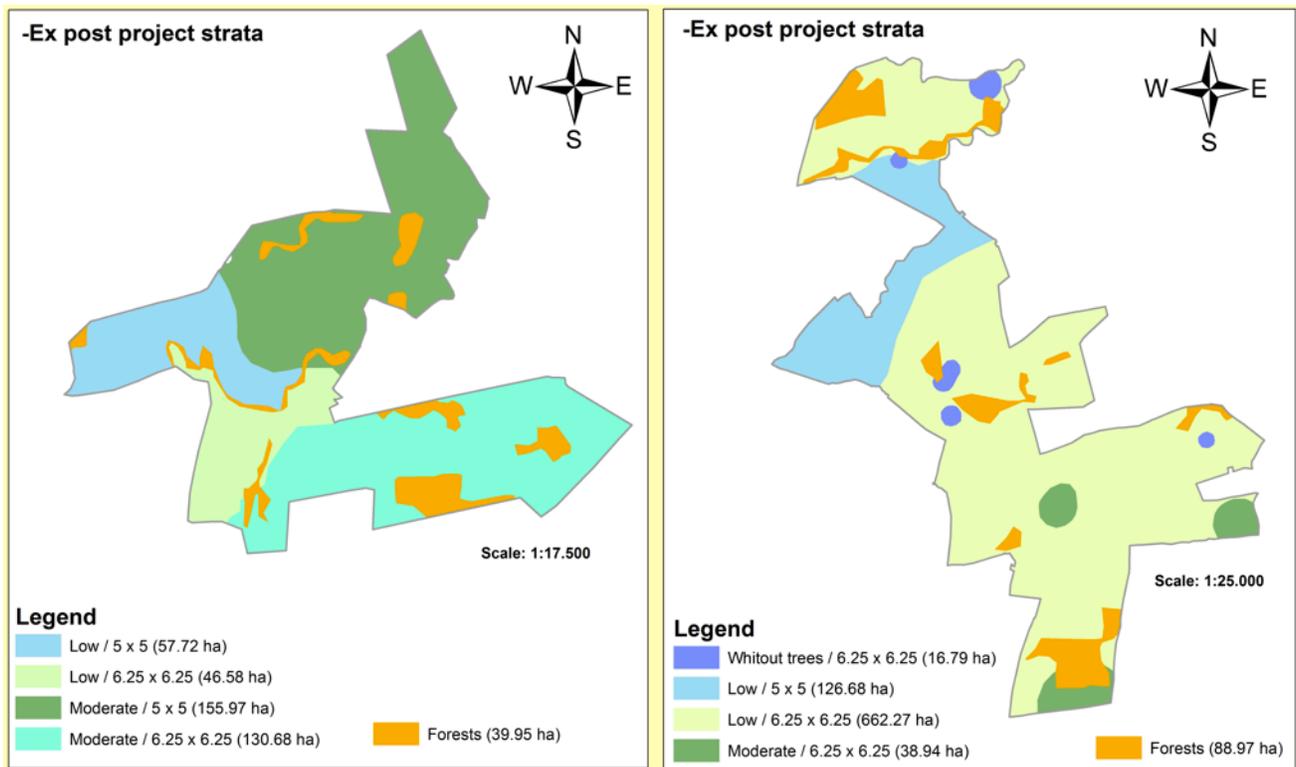
**Figure 18 Location and boundaries of the proposed project areas**



The project activities will occur in all strata other than areas designated as forests and those set aside for conservation areas. The exact location of project activities is identified in the below maps. There is not expected to be any leakage from the project activities.

For the map of the project location, its boundaries and specific areas of direct and indirect project influences refer to figures in section G1.3 and G1.5. The project expects areas outside the project area to be positively influenced both directly and indirectly by environmental and social impacts of the project activities throughout the lifetime of the project.

**Figure 19 Location of project activities**



G3.4 Define the project lifetime and GHG accounting period and explain and justify any differences between them. Define an implementation schedule, indicating key dates and milestones in the project's development.

The implementation schedule for EcoPlanet Bamboo’s first project areas are defined below.

**Table 5 Timeline of project activities, in 2011 - 2012**

<b>2011</b>	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Nursery development												
Land acquisition												
Land preparation												
Planting												
Maintenance												
Fencing												
Road Building												

<b>2012</b>	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Nursery development												
Land acquisition												
Land preparation												
Planting												
Maintenance												
Fencing												
Road Building												

Subsequent maintenance and monitoring occurs periodically through Years 2-4. From year 3-7, thinning of bamboo occurs in order to increase biomass productivity and commercial viability for harvesting activities, which will commence in years 7 and beyond.

During the first 7 years of project development, carbon finance will be utilized to pay off project debt and commitments to investors. Post this period, once the project becomes self sustainable, carbon finance will be utilized to develop additional SME bamboo based industries for the region, further ensuring the project’s long term viability and maximizing social impact.

Additionally, the project has clear milestones, which it will meet through the course of the projects and

are in line with EcoPlanet Bamboo goals of creating positive impact socially, environmentally and financially. These milestones and their indicators are detailed in the table below.

**Table 6 Project Milestones**

Milestones	Date	Indicators
Baseline and Project Scenario Study	Q1 2011	<ul style="list-style-type: none"> <li>EIA Conducted with baseline data provided for social and environmental aspects</li> </ul>
Acquisition of Project Financing	Q4 2011	<ul style="list-style-type: none"> <li>80% of project financing acquired</li> </ul>
Development of Plantations	Q2, Q3 & Q4 2011	<ul style="list-style-type: none"> <li>Land acquired and legal documentation acquired</li> <li>Workforce hired utilizing fair employment practices and training occurred for all aspects of project activities</li> <li>Nurseries established</li> <li>Planting of project area occurred and maintenance activities carried out</li> </ul>
Utilization of Fully Organic Methods	Q1 2012	<ul style="list-style-type: none"> <li>Elimination of non-organic chemicals and fertilizers and move towards an integrated pest management system</li> </ul>
Acquisition of Certifications	Q4 2012	<ul style="list-style-type: none"> <li>Project Development PDD</li> <li>The Project has acquired the following certifications:                             <ul style="list-style-type: none"> <li>FSC</li> <li>CCBA</li> <li>VCS</li> </ul> </li> </ul>
Sale of VCUs	Q1 2013	<ul style="list-style-type: none"> <li>Use of VSC registry to access a buyer</li> </ul>
Sustainable Harvesting of Bamboo as an Alternative to Timber	2018	<ul style="list-style-type: none"> <li>Harvesting of bamboo as indicated in the management plan</li> <li>Selling bamboo on the global market for engineered wood products</li> <li>Increasing market share of bamboo products to alleviate pressure on the world's forests</li> </ul>

Blue cells indicate milestones already achieved.

G3.5 Identify likely natural and human-induced risks to expected climate, community and biodiversity benefits during the project lifetime. Outline measures adopted to undertake to mitigate these risks.

The following table shows the risks, which have been identified for the project as well as mitigating measures for each risk

**Table 7 Risk Assessment and Mitigation Measures**

<b>Risk</b>	<b>Risk Level</b>	<b>Description</b>	<b>Mitigation Measures</b>
Fire	Low	High humidity and frequent rain makes fire breakouts very rare. The only real threat would be from combustibles such as gasoline or chemicals.	Fire training course created by Bluefield's fire department, flammable/chemical organization and separation in storage, protocols surrounding fire prevention and fire emergencies including designated fire teams
Flood	Medium	With frequent rain, flooding in certain areas are not uncommon.	Specification of areas prone to flooding such as elevation drops and perception of flooding, drainage ditches created were these areas are present, constant monitoring
Drought	Low	With frequent rain, droughts in all areas surrounding the farms are rare. Bamboo, once past the first year, is very susceptible to droughts.	For our nursery operations there is pump irrigation in place to ensure proper watering, constant monitoring as well as manual watering procedures are in place for newly planted plants during times without rain.
Pests	Medium	There are pests that present problems for both young and mature bamboo plants specifically to Nicaragua	An integrated pest management document is in place identifying current and possible pests in the farms. The staff also frequently monitors the plants and reports any problems to upper management.
Harm to conservation areas	Low	Deforestation, hunting, fishing, littering	All staff has been made aware of the conservation both by the maps displayed in the offices and the signs displayed surrounding this area
Harm to environment	Low	Any leeching of chemicals, cutting down of living trees, improper chemical use	Protocols surround proper storage of chemicals, all staff is aware of the prohibition of cutting down any trees in property, protocols are in place detailing proper usage of chemicals and all staff is aware of this
Injury	Medium	Machete Accidents, Snake bites, Falls, Machinery accidents, Burns	Each farm director as well as staff from each working zone is trained in basic first aid; protocols have been created for all injuries relevant to the farm.
Heat exhaustion Dehydration	Medium	Many days in the fields of Nicaragua can be very hot and sunny.	Protocols surround the steps to take when signs of these types of issues are apparent, all supervisors and/or working staff have water with them at all times

G3.6 Demonstrate that the project design includes specific measures to ensure the maintenance or enhancement of the high conservation value attributes identified in G1 consistent with the precautionary principle.

All areas within the EcoPlanet Bamboo plantations that are currently forested will be dedicated as conservation areas. All watercourses, perennially humid areas, and riparian buffers within ten meters of all watercourses will be dedicated as riparian corridor conservation areas. All large remnant pasture trees of ecological value will also be left to increase the project's overall forest cover and to enhance the

biodiversity benefits of the plantations. All efforts will be made to assure increased habitat connectivity when site selections are being made for internal plantation roads and the location of infrastructure.

Conservation areas have been mapped using GIS and GPS equipment, with forest conservation zones receiving a dedicated permanent status both in the plantation GIS database, and on the ground. Conservation areas will be diligently identified and surveyed during the plantation establishment stages. This will assure the protection of important forest reserves and enhance the ecological value of the plantations. In later stages of development, EcoPlanet Bamboo may begin a project of low-intensity enrichment plantings within the forest reserves and along the edges of plantations to enhance tree species diversity and habitat quality.

Signs have been posted all over the farm to be concerned with the protection of the environment (No hunting, no fishing, no cutting trees and fire protection)

- *Buffer zones*
  - A buffer zone is a strip of natural vegetation located between developed or agricultural land. Our buffer zones are a 200 meter border surrounding our farm and are protected and provide a habitat for wildlife. At EPB these buffer zones are found to be a very sensitive area in which agricultural chemicals or other damaging environmental behaviour, such as hunting or littering, is prohibited. Numerous signs are posted around the buffer zones that clearly state: No hunting, fishing, or cutting of trees is allowed.
- *Riparian areas*
  - Supervisors letting the staff know of these rules, having clearly posted signs, secure this and we also have guards surveying the property during working hours ensures these protected areas are safe from harm.

G3.7 Describe the measures that will be taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime.

EcoPlanet Bamboo has formed a long-term commitment not only to the project but also to the region and the country as a whole. By involving local people in the setting-up of the plantation, EcoPlanet Bamboo will help the local community develop skills in plantation management as well as promote

environmental awareness. These inputs will provide the community with long-term benefits over and beyond the project itself.

EcoPlanet Bamboo is committed to carrying out research in to the development of bamboo such as *Guadua aculeata* as a sustainable alternative to traditional hardwoods. The project aims to develop a market for such certified wood, therefore encouraging the development of additional projects, ensuring not only the continued climatic benefits, but also associated social and environmental gains.

Although in carbon finance terms, the lifetime of the project is 20 years, the lifetime of the activities generated during this period extend long beyond the project lifetime. As harvesting of bamboo is selective and does not kill each plant, it provides an on going and renewable resource. With the integration of high end processing plants, as global availability of traditional hardwoods continues to decrease, demand for sustainable alternatives is expected to increase, thus fuelling the proposed project's success long in to the future.

EcoPlanet Bamboo intends to undertake significant debt to undertake the construction of value added manufacturing and processing plants, within the greater project area. This indicates the project proponents' long term commitment to the climate, community and biodiversity benefits far beyond the scope of the immediate project lifetime.

Further long term mechanisms are described in 3.3 and 3.4 above.

G3.8 Document and defend how communities and other stakeholders potentially affected by the project activities have been or will be identified and involved in project design through effective consultation with a view to optimizing community and stakeholder benefits, respecting local custom and values and maintaining high conservation values.

The project proponents' general objective is to create a positive impact on the socio economic situation in the nearby communities surrounding EcoPlanet Bamboo projects. The main social problems in the communities surrounding the farms are: unemployment, low pay and poor quality of jobs, lack of social security registration number and therefore unentitled to receive social benefits, very low levels of education (the majority have at most third grade of schooling) and more than half of the households in

these communities live on dirt flooring.

The project's mission is to have a strong positive impact both directly and indirectly that will benefit the communities located nearby the project boundaries achieved through job creation, training, and increased opportunity and stability within the region. Employment creates a significant amount of currency which will benefit families directly but will also help the community indirectly by promoting grocery stores, businesses, transportation, trades and more money coming in and flowing through. EcoPlanet Bamboo is also committed to support local initiatives to strengthen capacities in the management of the agronomy of natural resources and provides support to finance the improvement of roads. In order to prevent accidents and injuries, EcoPlanet Bamboo has invested in numerous training programs and provides necessary equipment to staff in order to support security and safety.

The project proponents have created strong relationships with community leaders, religious leaders, social actors and prominent figures within the nearby surroundings as well as the municipal Government and the government institutions of El Rama.

G.3.9 Describe what specific steps have been taken and communication methods used to publicize the CCBA public comment period to communities and stakeholders to facilitate submission of comments to CCBA.

EcoPlanet Bamboo has made this CCBA submission available on its website, and has distributed it to the major shareholders as listed above.

G3.10 Formalize a clear process for handling unresolved conflicts and grievances that arise during project planning and implementation. The project design must include a process for hearing, responding to and resolving community and other stakeholder grievances within a reasonable time period. This grievance process must be publicised to communities and stakeholders and managed by a 3rd party to prevent conflict of interest. Project management must attempt to resolve all reasonable grievances and provide a written response within 30 days. Grievances and project responses must be documented.

EcoPlanet Bamboo has defined a process for dealing to ensure quick and efficient resolution of any

conflicts and grievances.

All field level conflicts can be communicated directly to the plantation manager who may already provide a satisfactory resolution to the conflict. If this member of staff is unable to deal with the issue at hand, he or she will report it to EcoPlanet Bamboo's Nicaragua Director, who commits to resolving such conflict within a two-week period. All conflicts and grievances will be recorded, including the manner in which they have been resolved.

There is also a suggestion box in place at both farm offices that is checked every two weeks by the farm director. These suggestions are also brought up at the monthly staff meetings to constantly improve worker satisfaction.

In practice, most community conflicts and grievances will be handled in a more casual manner. Project staff at all levels of management are based on site, hence very accessible to locals if there are grievances that may arise.

G3.11 Demonstrate that financial mechanisms adopted, including projected revenues from emission reductions and other sources, are likely to provide an adequate flow of funds for project implementation and to achieve the anticipated climate, community and biodiversity benefits.

EcoPlanet Bamboo has utilized several sources of revenue and cash flow. This approach is designed to provide certainty of cash generation rather than relying on a single source.

The company has managed to generate substantial cash sums from the leasing of real estate assets and this process continues with no anticipated drop in revenue from this source. Equally, the company has access to both private debt financing.

By the end of 2012, the company will have reached the end of its real estate leasing activities, which will bring in approximately \$11m of revenue. Almost 50% of that target has been reached to date. Equally around \$10.5m of private debt has been placed in the last year. These sources of cash have financed company operations to date.

EcoPlanet Bamboo expects the project activities to generate \$5m of carbon finance over the next 7 years. These funds will provide sufficient capital to pay off early years of project debt until the project becomes self financing, and meet all obligations of the company, including those related to the achievement our planned climate, community and biodiversity benefits.

#### **G4. MANAGEMENT CAPACITY AND BEST PRACTICES**

---

*The success of a project depends upon the competence of the implementing management team. Best practices for project management include: local stakeholder employment, worker rights and safety, and a clear process for handling grievances.*

G4.1 Identify a single project proponent responsible for the project's design and implementation. If multiple organizations / individuals are involved in the project's development and implementation, the governance structure, roles and responsibilities of each must be described

The sole project proponent is EcoPlanet Bamboo Group.

EcoPlanet Bamboo has designated its local subsidiary, EcoPlanet Bamboo Nicaragua SA (registration number 41,433-B5), to manage all daily operations relating to the implementation of project activities.

G4.2 Document key technical skills that will be required to successfully implement the project, including community engagement, biodiversity assessment, carbon measurement and monitoring skills. Document the management team's expertise and prior experience implementing land management projects at the scale of this project. If relevant experience is lacking, the proponents must either demonstrate other organizations that will be partnered with, or have a recruitment strategy to fill the gaps.

The EcoPlanet team has all the necessary skills needed to implement this project, starting from plantation management, agro-forestry, carbon resource management and investment management along-side in-depth regional experience.

### **John Vogel – President EcoPlanet Bamboo Central America**

An agronomist by trade, John has managed plantation operations in Central America, Africa and Asia. John's experience in Latin America is extensive and encompasses the management of many indigenous and commercially viable species, as well as the often complex process of bringing these products to market. John has all necessary skills to ensure the long term success of the revegetation project activities within the chosen region.

### **Camille Rebelo – EcoPlanet Bamboo Partner and Co-Founder**

Camille is an expert on the financing and commercialization of sustainable forestry initiatives. She has worked in the public and private sector and has experience in the origination, implementation, deliverance and management of carbon forestry projects under both voluntary and compliance markets. Camille has extensive experience in the development of large scale commercial forestry plantations across Latin America, Africa and Southeast Asia. She holds a BSc in Ecology from Imperial College, London, and a Master's from Yale University's School of Forestry and Environmental Studies.

### **Troy Wiseman – EcoPlanet Bamboo CEO and Co-Founder**

Troy is a successful entrepreneur and businessman with a heart for impacting social change. Troy has founded and managed businesses since he was 21 and has the ability to apply business sense to projects usually only deal with by the non profit sector, ensuring long term sustainability. He has served as Vice Chairman of Legatum, a multi-billion dollar investment company, remains a Mentor for the Legatum Institute of Entrepreneurship at MIT Troy and is an active philanthropist through the Wiseman Family Foundation and was also the co-founder of World Orphans, which has helped fund the construction of over 500 orphanages in 45 countries.

### **Juan Carlos Camargo Garcia – Guadua Bamboo and Carbon Expert**

Juan Carlos is an expert on the growth dynamics of Guadua bamboo, predominantly in his native Colombia. EcoPlanet Bamboo partnered with Juan Carlos to carry out all inventory work, carbon fieldwork, assessment of growth dynamics and biomass and carbon assessments relating to the project activities. Juan Carlos will remain in charge of all on going monitoring.

### **Maria Luisa Lira Miranda - Rio Siquia Plantation Manager**

Maria Luisa holds strong leadership and dedication to Bamboo. She was hired by EcoPlanet Bamboo as a casings supervisor in 2011 and quickly rose in the ranks becoming Rio Siquia's General Supervisor

before being hired as the Plantation Manager. Prior to working for EcoPlanet Bamboo, she worked as a teacher for a local elementary school. Maria Luisa holds a degree from Martin Luther University in Agricultural Engineering.

### **Henry Hernandez - Rio Kama Plantation Manager**

Henry Hernandez is an Agro-Forestry Engineer by profession with a degree from The Bluefield's Indian Caribbean University (BICU). Henry specializes in forest mensuration and inventory as well as conservation of soil and water resources, areas for which he lent his expertise as a professor at Popular University of Nicaragua (UPONIC) and Martin Luther University. Following his professorship, he moved to Rio San Juan to work with the Ministry of Natural Resources (MARENA) as a forester specialized in sustainable forest management. Today, he works as Rio Kama's Plantation Manager where he supervises the operational process from seed to harvest.

A number of middle management positions exist in order to implement and sustain this project. Within each project area is the Plantation Manager, General Supervisor, Warehouse Supervisor, Fencing Supervisor, Nursery Supervisor, Payroll Supervisor, Zone Supervisors and Assistant Zone Supervisors as indicated in the figure below.

Locally, its pool of technical staff has rich experiences in community organizing, reforestation and agro-forestry projects and activities. Where the project proponents have not had the necessary skills, specialists and consultants have been employed to deliver specific services, with regards to both project development and carbon fieldwork.

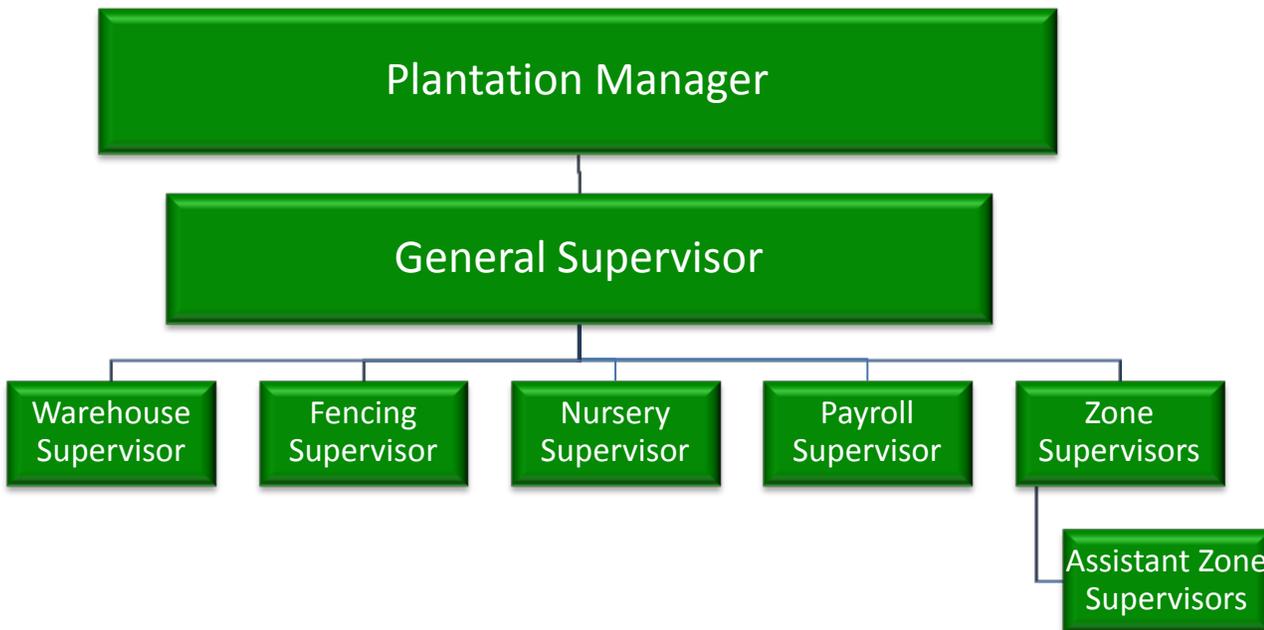
**Figure 11 Middle management positions**

G4.3 Include a plan to provide orientation and training for the project’s employees and relevant people from the communities with an objective of building locally useful skills and knowledge to increase local participation in project implementation. These capacity building efforts should target a wide range of people in communities, including minority and underrepresented groups. Identify how training will be passed on when there is staff turnover.

All of EcoPlanet Bamboo’s employees undergo orientation and training inline with their duties, prior to being given responsibility. In addition to the basic internal training that every employee receives upon employment, the following training sessions have been carried out to date – aimed at increasing the capacity of the staff team at all levels, as well as providing opportunities for rising between positions.

Internal Training Courses

Farm Tractor Training Course		
Provided Training	Number of Students	Dates



Adrian Castro – Agro Star Farming Equipment and Tractor Specialist	8	12/13/2011 to 12/15/2011
Brief Description	Employees were trained in performing maintenance to the manufacturers instruction manual standard, ensuring the tractor is in a safe condition and working at optimal performance, and proper safety guidelines while using the tractor are met. They were also taught to connect and disconnect add-on equipment (Trailer, forklift, roof)	
Experience Gained	Safe operation of the tractor was achieved through instructions, training, and constant supervision of the specialist while the worker gains experience in tractor operation.	

---

#### Weed Whacker Training Course

Provided Training	Number of Students	Dates
Eliaser Madaraga – Forestry Equipment for Maintenance Specialist	4 per farm (8 in total)	10/11/2011 to 10/12/2011 (Rio Siquia) 10/13/2011 to 10/14/2011 (Rio Kama)
Brief Description	Workers were trained on proper equipment use, proper maintenance procedures, necessary measurements of weed whackers blades when in need of tune up, and most importantly proper safety guidelines and use of the necessary personal protective equipment.	
Experience Gained	To reduce the risk of injuries while using weed whackers, workers were properly trained on correct techniques. They also gained experience in identifying the invasive plant species on the plantations and a variety of techniques for eradicating them.	

---

#### Fire Safety and Protection Training Course

Provided Training	Number of Students	Dates
Three Elite Firefighters from the Bluefields Fire Department of Nicaragua	25 – Rio Siquia 15 – Port Rama 26 – Rio Kama	01/30/2012 – Rio Siquia & Port Rama 01/31/2012 – Rio Kama
Brief Description	The workers were trained in identified materials that are potential fire hazards and their proper handling and storage procedures. They also learned how to distinguish potential ignition sources and the proper control procedures of those materials. A team was created on each farm responsible for maintaining the equipment and systems installed to prevent or control ignition of fires. A live demo was also initiated to put these techniques into practice.	

Experience Gained	The purpose of this Fire Prevention Plan training is to avoid the causes of fire, prevent loss of life and property by fire, and to comply with the Forestry Stewardship Council of Fire prevention. This training provides employees with information and guidelines that will assist them in recognizing, reporting, and controlling fire hazards.

### External Training Courses

Bamboo Workshop Training Course		
Provided Training	Number of Students	Dates
Louis Prado – Columbian Artisan	6	01/06/2012 to 04/06/2012
Brief Description	Employees trained in the art of bamboo construction and general handcrafting. Items such as desks, tables, napkin holders, business card and penholders, lamp stands, and fruit holders were created to show the unlimited variety of crafts that can be created. The kitchen in our Rio Kama farm is also constructed completely out of bamboo as well as a bamboo ceiling in the protocol house.	
Experience Gained	The students are taught to use numerous types of machinery to gain the desired effect while fashioning or constructing with bamboo. With this knowledge they will be achieve a better understanding of the structure and strength of bamboo as well as the opportunity to create works of art or even buildings out of this wood substitute.	

Reading and Writing Classes		
Provided Training	Number of Students	Dates
Adriana Guevara Martinez – Professor from University of Managua (Degree in Education)	15	02/02/2012 to 05/02/2012

Brief Description	A teacher along with two supervisors trained 15 illiterate employees how to read and write. The classes are one hour in duration and consisted of half application and half video presentation to appeal to students. The workers get out of work and hour early to participate in this class, with no penalty to their normal daily wage.
Experience Gained	There are obvious benefits with having the knowledge to read and write. Since illiteracy is a common problem in developing countries, we believe it is essential to improve in the community our operations are set in.

### Upper Management Training

#### Bamboo Construction Workshop and Guadua Exhibition

Provided Training	Attendance	Dates
Jorg Stamm – Bamboo Architect	John Vogel Chase Wiseman Bernardt Vogel	Exhibition 09/05/2011 to 09/06/2011 Workshop 09/07/2011 to 09/09/2011
Brief Description	The exhibition, Viva Guadua International Bamboo Festival, was held in Cali, Columbia, which is the hub for Guadua Angustafolia production. Key speakers and attendees included Fransisco Nieto, Ximena Londono, Jorg Stamm, and other renowned bamboo specialists. Along with presentations our trip also included a workshop where we learned much about the use of bamboo in construction and also information on treatment.	
Experience Gained	Aside from two days of knowledge and contacts acquired from the bamboo presentations, we were able to experience and understand the steps it takes to dry, cure, split, and construction with bamboo, and the proper steps to take in managing a successful warehouse and processing plant.	

#### Evaluation and Training Course provided by Jorg Stamm

Provided Training	Attendance	Dates
Jorg Stamm – Bamboo Architect	John Vogel Bernardt Vogel Henry Hernandez Maria Luisa Lira Feliciano Sequeira Nery Espinoza Sergio Orozco Noel Talavera Silvio Calero	09/26/2011 to 10/03-2011

Brief Description	<p>Jorg shared with us his experience working for over 20 years in the bamboo world. Through lecture, videos and workshops he gave all upper management and a few supervisors an insight to bamboo processing, construction, and demonstration of the many bamboo infrastructures built worldwide.</p> <p>Jorg spent multiple days in Rio Kama evaluating the resistance of Guadua Aculeata and teaching the team important skills such as using axes to create bamboo splits and fences.</p>
Experience Gained	The upper management team learned the steps in order to create a range of bamboo infrastructures; the materials and tools needed to start a bamboo workshop, and how to harvest, dry, and cure bamboo efficiently and effectively.

---

Evaluation and Presentation provided by Francisco Castano Nieto

Provided Training	Attendance	Dates
Francisco Castano Nieto – Guadua Bamboo Professor “Godfather of Bamboo”	John Vogel Bernardt Vogel Chase Wiseman Henry Hernandez Maria Luisa Lira Feliciano Sequeira Nery Espinoza	10/04/2011 to 10/11/2011
Brief Description	Francisco’s visit covered many areas such as propagation, farm management, maintenance, integrated pest management control, harvesting, immunization, Guadua selection uses, markets, and social and economic aspects. His week in Nicaragua consisted of visits to both farms, Rama office and evaluation of natural bamboo bordering Rio Escondido seen on a boat trip to Rio Kama.	
Experience Gained	Through video demonstration and lectures the upper management acquired crucial expertise on the management, uses and proper treatment of bamboo, as well as its voluminous amount of uses. President, VP’s, and Farm directors where trained on doing bamboo sampling and measurements and adequate thickness, weight and diameters for specific uses.	

---

Evaluation, Presentation, Taxonomy provided by Ximena Londono

Provided Training	Attendance	Dates
Ximena Londono – Bamboo Taxonomist and Professor	John Vogel Bernardt Vogel Chase Wiseman Henry Hernandez Maria Luisa Lira	10/24/2011 to 10/31/2011

	Feliciano Sequeira Nery Espinoza Sergio Orozco	
Brief Description	Ximena spent a week in Nicaragua overseeing the Rio Siquia, Rio Kama plantations; she took a boat trip with president and VP's to Rio Kama bordering the natural bamboo found along the river. During her time in Rama she gave a presentation giving a brief summary of the many species of bamboo and their sub species. As well as the main characteristics that differentiate Guadua from any other bamboo species. On her last two days she went to Rio Cua with John Vogel, where she evaluated the mature <i>Guadua aculeata</i> , its behaviour, health and growing pattern.	
Experience Gained	The upper management team was trained in the Taxonomy of bamboo and Guadua's many subspecies as well as proper growing techniques.	

---

Evaluation, Presentation and proper bamboo management provided by Hormilson Cruz

Provided Training	Attendance	Dates
Hormilson Cruz – Bamboo Taxonomist and Professor	John Vogel Bernardt Vogel Chase Wiseman Henry Hernandez Maria Luisa Lira Feliciano Sequeira Nery Espinoza Sergio Orozco	01/14/2012 to 01/21/2012
Brief Description	During his visit Mr Cruz. Shared with upper management his experience with farming, harvesting and processing bamboo. Through lectures and video demonstration he guided us on the different phases of the plantation and what to expect.	
Experience Gained	The team got to learn about similar plantation projects happening in Mexico, compare and measure results, and what to expectation in a large operation. Also knowledge on the importance of irrigation and farming in an area with different climates and vegetation.	

---

Carbon Credit Certification

Provided Training	Attendance	Dates
Juan Carlos – Professor and Carbon Sequestration Specialist	Chase Wiseman Bernardt Vogel Henry Hernandez Nery Espinoza	01/07/2012 to 01/21/2012

Brief Description	In preparation for our VCS certification, we hired Juan Carlos and two of his students to provide us with an assessment to give us an idea of how much carbon sequestration our two farms have. Through state of the art technology and data collection procedures they established a system in predicting the positive impact our operations will create for the environment and how much carbon sequestration will take place. A monitoring plan was also built for us so that we have an accurate and unbiased way to monitor progress.
Experience Gained	We were being educated from the beginning, starting with the ideology behind collecting specific data to determine carbon sequestration to participating in the physical collection itself. We attained well-rounded knowledge on the most current collection strategies and methods in predicting long-term carbon sequestration impacts and ways to monitor this progress.

G4.4 Show that people from the communities will be given an equal opportunity to fill all employment positions (including management) if job requirements are met. Project proponents must explain how employees will be selected for positions and where relevant, indicate how local community members, including women and other potentially underrepresented groups will be given a fair chance to fill positions for which they can be trained.

Local residents will be given preference in the recruitment process, except for highly technical positions that can't be filled from the local area. Involvement of men and women is dependent on the kind of task and capacity of the individuals. However, efforts will be made to give equal opportunity to men and women. Jobs in the nursery operations in particular are generally suitable for women, so the project proponents will target recruitment for these jobs at women.

The project will preferentially hire local residents from the municipalities close to the sites for all wage labour positions. Higher order positions will need to be filled by qualified individuals, with preference going to preference given to locals and Nicaraguan nationals. Individual interviews are carried out for

any applications, and EcoPlanet Bamboo does not hire based off gender, religion nor political inclination. EcoPlanet Bamboo aims to hire at least 25% women. In a nation with a long history of gender inequality the project proponents hope to empower women by giving them equal opportunity to work and train, with the hope of achieving greater independence and upward mobility. The project will actively recruit and train women from the local community to participate, particularly for lower-intensity positions such as nursery work and plant propagation, as well as growth performance monitoring and plantation oversight and maintenance. Steps in pre-hiring process include meeting with upper management, Key requirements are developed and prioritized for the job at hand and salary range is determined based on budget and work type. Recruiting applicants from broadest pool possible within the community starts the hiring process and resumes are reviewed. Then personal interviews are conducted followed by a final evaluation by upper management.

G4.5 Submit a list of all relevant laws and regulations covering worker's rights in the host country. Describe how the project will inform workers about their rights. Provide assurance that the project meets or exceeds all applicable laws and/or regulations covering worker rights and where relevant, demonstrate how compliance is achieved.

The main piece of legislation-addressing workers' rights in Nicaragua is the *Codigo de Trabajo*. Nicaragua is also a member of the International Labour Organisation. EcoPlanet Bamboo has set up its operations in accordance with both sets of rules and regulations. This will be further confirmed by Forest Steward Council certification, which the company is also pursuing.

EcoPlanet Bamboo has informed its workers of their rights as part of the staff training plan and allow them to exercise their rights within the plantation operations. Management held a meeting with Farm Directors, general supervisors and Accountants on Wednesday February 22, 2012, the meeting took place in the project's Rama Office. The purpose of this meeting was to hand in and review that all the documentation and laws applicable where present in both plantations and offices. Each Farm Director was handed with a copy of the "*Codigo del Trabajo*" and a Spanish version of International Labour Organization. They were instructed to carefully go over each document with all the Farm supervisors. The Farm supervisors where told to gather their individual team and go over all the laws in each Document, a large group of the workforce is illiterate, therefore supervisors had to read documents and go over them frequently until employees have come to an understanding of all the guidelines, rights,

laws and objectives that need to be met and enforced.

Digital copies are available and ready to be printed in the Rama office in case documents need to be replaced by newer copies.

G4.6 Comprehensively assess situations and occupations that pose a substantial risk to worker safety. A plan must be in place to inform workers of risks and to explain how to minimize such risks. Where worker safety cannot be guaranteed, project proponents must show how risks will be minimized using best work practices.

The proposed project activities within the first 4 year period do not pose any risks to worker safety. All land preparation and planting will be done manually, with little mechanized processes.

Once harvesting occurs, EcoPlanet Bamboo will take the following measures to ensure a safe work environment and to minimize any risks to worker safety:

- All workers will be fully trained in the use of chain saws for the cutting of bamboo culms. No worker who has not passed an internal test regarding such usage will be allowed to operate such machinery.
- All workers involved in the harvesting of bamboo culms will be provided with hard hats. Use of such hats will be mandatory.
- All workers involved in the harvesting of bamboo culms will undertake a course on basic first aid, and be aware of all procedures in the case of any emergency
- We combat Dehydration and heat exhaustion through:
  - Trained field personnel
  - Accessible fluids
  - Minimizing exposure to sun and taking breaks.

A common risk in the surroundings is venomous Snakebites, scorpions and other stinging insects. Our safety measures towards these accidents are:

- Enforce all workers to have Proper Footwear
- Snake bite kits accessible in all offices.
- First aid kits accessible in all offices.
- Trained medical personnel in the field.

A group of 25 employees in each farm have been trained and certified by the National Fire fighters with appropriate fire prevention and safety through

- Training and monitoring.
- Creation of Fire breaks.
- Having necessary equipment to prevent fire and the appropriate PPE in case of fire.
- Making all staff aware of the Fire prevention plan.

G4.7 Document the financial health of the implementing organization to demonstrate that financial resources budgeted will be adequate to implement the project.

A financial model relating to project activities has been provided separately. The project aims to use a form of debt capital combined with carbon finance repayments during the early years to cover the capital costs of project activities.

## **G5. LEGAL STATUS AND PROPERTY RIGHTS**

---

*The project must be based on a solid legal framework (contracts in place) and the project must satisfy applicable planning and regulatory requirements.*

*During the project design phase, the project proponents should communicate early on with relevant local, regional and national authorities in order to allow adequate time to earn necessary approvals. The project design should be sufficiently flexible to accommodate potential modifications that may arise as a result of this process.*

*In the event of unresolved disputes over land tenure or resources in the project zone, the project should demonstrate how it will help bring them to resolution so that there are no unresolved disputes by the start*

*of the project.*

G5.1 Submit a list of all relevant national and local laws and regulations in the host country and all applicable international treaties and agreements. Provide assurance that the project will comply with these, and, where relevant demonstrate how compliance is achieved.

Copies of all relevant laws are found within all project offices, and all project staff in management and supervisory positions are familiar with and adhere to such laws. These are detailed below.

The two bodies that govern forestry in Nicaragua are:

- MARENA: the Ministry of Environment and Natural Resources
- INAFOR: the National Forestry Institute

Within these two institutions, the laws governing the development of forest resources in Nicaragua are as follows:

National laws:

- Law General del Ambiente
- Law forestal
- Reglamento forestal
- Normas Técnicas y Disposiciones Administrativas del Instituto Nacional Forestal (INAFOR)
- Law de áreas protegidas y su reglamento
- Law de Autonomía de las Regiones de la Costa Caribe (RAAN y RAAS)
- Law de Municipios
- Código del Trabajo

EcoPlanet Bamboo's Forest Management Plans and all Plantation activities have been developed in line with all above laws and regulations. These laws are available within the Company's offices in Managua and Rama, and are familiar to all management.

EcoPlanet Bamboo met with MARENA and INAFOR on April 11<sup>th</sup> 2011, prior to project development,

and obtained verbal approval for the development of plantations of *Guadua aculeata* in the RAAS. Once completed, the environmental impact assessment (EIA) will be presented to these institutions for written approval.

Whilst domestic use is well established, the development of bamboo as a commercial resource is a relatively new concept in Nicaragua. As such, EcoPlanet Bamboo is committed to working with MARENA and INAFOR to develop appropriate policies and regulations surrounding the growing, harvesting, and export of a bamboo product.

EcoPlanet Bamboo commissioned an Environmental Impact Assessment in May 2011 by Fiallos and Associates, a local firm specialized in forestry project development. This study identified the following laws and regulations that might have relevance to the proposed project activities. The project activities will occur within the project areas as defined by the boundaries of the project zone as stated in section G1.3. It is important to note that bamboo is not accounted for within the classification of ‘forest’. However, EPB has chosen to develop its project activities adhering to such laws, believing them to be the most relevant for the project.

**Table 8 Applicable Nicaraguan Laws**

Legal Framework	Publication	Article
<b>Environment Sector</b>		
<b>Law 217</b>	La Gaceta No. 105 / June 6, 1996	In Article 4 3) The prevention approach must prevail over any public and private management of the environment. You may not claim lack of scientific certainty as a reason for not taking preventive measures in all the activities that impact the environment.
		Article 72, mandate must respect at least the first 30 meters of land after the maximum flood line of the beach, sea, river and lake, river bed of the streams and the beds of natural waters, salty lands, considering that the area is a public domain.
		Article 141: Any person, who by act or omission impairs the environment, is obliged to repair the damage caused to environmental resources, the ecosystem balance, health and quality of life of the population. Similarly, the principle of sustainable development if the whole spirit of this law..
<b>Law 462</b>	La Gaceta No.	Art. 1. Establishes the legal regime for the conservation, development and

Legal Framework	Publication	Article
	168 /Sept. 4, 2003.	sustainable development of forestry from forest management and natural forests, promotions of plantations, protections, conservation and restoration of forest areas.
		Art. 8. It creates the National Forestry Registry Office, where the information will be public and free and administered or regulated by INAFOR. Forestry in the National Register INAFOR record: b) Forest plantations.
		Art. 16. All logging activities, must comply with the mandatory standards of forest management in the country. INAFOR will issue a forest certificate for timber to be marketed in the country and come from registered forest plantations and natural forest areas under management.
		Art. 18. Forest plantations and natural forest areas under private management or state, have special protection in case of invasion or other illegal actions that violate them. Police authorities should provide the appropriate assistance to the owners or any civil or military authority upon request to proceed according to law or to prevent eviction and neutralize the activities that destroy or cause damage to the forest resource.
		Art. 19. Prohibits the cutting, removal or destruction of protected and endangered species that are registered in national lists and the international conventions ratified by the country. Except from planted trees properly registered on the National Register of Forestry. Se exceptúan los árboles provenientes de plantaciones debidamente registradas en el Registro Nacional Forestal.
		Art. 24. Plantations carried out in any field do not require any permission for their establishment, maintenance, thinning and harvesting, but must comply with registration requirements and negotiate with the INAFOR it for the certification of the origin of the product for purposes of transportation.
		Art. 25. Forest plantations can be done in areas of sustainability for forestry or other skills, while there are no rules or regulations that specifically prohibit it. It prohibits the replacement of natural forest for forest plantations.

Legal Framework	Publication	Article
		<p data-bbox="516 226 1333 499">Art. 30. For purposes of transportation by any means, all forest products from the exploitation of natural forest or plantations must have a certificate of origin attesting to its legality, which will be issued by INAFOR at no cost. If coming from Protected Areas issuing the certificate will be up to MARENA. The Regulations specify the procedures and mechanisms to ensure the security certificates and respective control.</p> <p data-bbox="516 520 1333 699">Art. 31. Person transporting or carrying out acts of commerce or conversion of forest raw materials, should ensure, in the terms specified in the regulations of this Act and forestry technical standards, that such activities come from harvesting duly authorized.</p> <p data-bbox="516 720 1333 1654">Art. 38. The following are established are special tax incentives for the sector:</p> <ol data-bbox="565 825 1333 1654" style="list-style-type: none"> <li>1. Enjoy exception of from payment of fifty percent (50%) of the Municipal Tax Sales and fifty percent (50%) on profits derived from use, those plantations recorded during the first 10 years of enactment of this Act.</li> <li>2. Exception from the payment of Property Tax to the areas of properties where plantations are established and areas where management is conducted through a Forest Management Plan, during the first ten years of enactment of this Act.</li> <li>3. Companies of any line of business to invest in forest plantations may deduct as an expense 50% percent of the amount invested by the end of IT (Income Tax).</li> <li>4. It exempt from Tax Internment companies of Second and Third Transformation, that import machinery, equipment and accessories to improve their technological level in the processing of wood, excluding sawmills.</li> <li>5. All state institutions should give priority in hiring, procurement of goods made from wood with the proper forest certification due by INAFOR, able to recognize up to 5% on the price difference in the bidding or completion cart.</li> <li>6. All natural and legal persons may be deducted up to 100% payment of IT when this is for the promotion of reforestation of forest plantations. For purposes of this deduction, the taxpayer must submit before its forestry initiative to INAFOR.</li> </ol>
		<p data-bbox="516 1671 1333 1791">Art. 39. The procedures for the establishment, acquisition and granting of incentives provided for in this Law shall be subject to special regulation issued by the Executive. The beneficiaries of the incentives created by this</p>

Legal Framework	Publication	Article
		Law, natural or legal persons who invest in natural forests and forest plantations by themselves or by third parties own or other premises and to comply with registration requirements established in regulations.
<b>Decree 73-2003</b>		Art. 60.- Management activities and forestry and timber species and forest plantations, which are carried out within protected areas shall comply with technical standards approved for that purpose, which should be framed in general management plan of each protected areas, according to management category.
<b>Law 585</b>	La Gaceta No. 120 / June 21, 2006	Art. 1. Provides for the protection of the country's natural resources are subject to natural security. It also states that the ban on Protected Areas will be permanent and indefinite, applicable to all tree species.
<b>Law 641</b>	La Gaceta No. 232 / December 3, 2007	Art. 364 Alteration of the environment or natural landscape, Who significantly alter or change in a disturbing way the natural environment or the urban or rural landscape, from their perspective, beauty and visibility, through changes in the field, advertising signs or advertisements of any kind, installing antennas, poles and transmission towers for electrical communications, without the Environment Impact Study or authorizations, or outside the cases provided for in the studio or the authorization shall be punished with one hundred to tree hundred days fine. In this case, the judicial authority shall order the removal of objects at the expense of the convicted.
		Art. 365 Pollution of Soil and Subsoil Who, directly or indirectly, without proper authorization from the competent authority and in contravention of the respective technical standards, discharge, deposit or seep or allow the discharge, deposit or infiltration of sewage, liquid or chemical or biochemical materials, waste of toxic contaminants in the soil or subsoil, with danger or harm to health, natural resources, biodiversity, water quality or ecosystem in general, shall be punishable with two to five years in prison and a hundred to one thousand day fine.
		Art. 366 Water Pollution Who, directly or indirectly, without the proper authorization from the competent authority and in contravention of the respective technical

Legal Framework	Publication	Article
		<p>standards, discharge, deposit or seep or allow the discharge, depositor infiltration of sewage, liquid or chemical or biochemical materials, waste or toxic contaminants in marine waters, rivers, watersheds, and other reservoirs or streams with danger or harm to health, natural resources, biodiversity, water quality or ecosystems in general.</p> <p>Art. 367 Air Pollution</p> <p>Who, without proper authorization from the competent authority and in contravention of the respective technical standards, through the use or performance or burning solid and liquid materials, chemicals or biochemical or toxic emissions generated or isolated or continuous discharge to pollute the atmosphere and air with fumes, smoke, dust or contaminants, causing serious damage to the health of people, natural resources, biodiversity or ecosystems in general.</p>
<b>Decree 107-2001</b>	La Gaceta, Diario Oficial No. 233 December 7, 2001	Art. 10: 2. Water should be managed and administered in a manner conducive to its multiple use due consideration to its interaction with other natural resources, particularly soil and forests.
<b>Decree No. 78-2003</b>	La Gaceta No. 220 November 2003	Art. 3.- Principles: 11. Prevention. The economic and social development of the country is subject to the discretion of prevention, which shall prevail over any other public and private management of wetlands. You may not claim the lack of full scientific certainty as a reason for not taking preventive measures in all activities that impact wetlands.
<b>Health Sector</b>		
<b>Law No.394</b>	La Gaceta No. 200, October 21, 1988	Art. 15.- Prohibits any discharge, emissions or emissions of air pollutants in nature, in concentration and non-permissible levels, resulting from personal activities, domestic, industrial, agricultural or any other nature that causes or contributes to air pollution.
<b>Law No 618</b>	La Gaceta No. 133 / June 13, 2007	<p>Art. 18: 2. Take the necessary preventive measures and measures the health and safety of its employees in all aspects of the job.</p> <p>14. Provide workers with free specific personal protective equipment, according to the risk of their work, give maintenance, repair and replace appropriate when access thus requires it.</p>

Legal Framework	Publication	Article
		Art. 19.- The employer must provide free appropriate means for workers to receive training and information through training programs on hygiene, safety and health of workers in the workplace.
<b>Municipal Sector</b>		
<b>Law 40</b>	La Gaceta No. 155 / August 17, 1988	Art. 7.- The Municipality exercises power on the following matters 2) Community Hygiene and Environmental Protection
<b>Law 261</b>	La Gaceta No. 162 / August 26,	c) Build, maintain and manage networks of energy supply at households and public level in the municipality.

In addition to national laws, Nicaragua is a party to the below conventions which revolve around environmental concerns. Abiding by the regulations of the FSC and various standards for project design and carbon certification, EcoPlanet Bamboo Nicaragua ensures that its plantation is not only in line with the below conventions, but contributes positively to their objectives.

International conventions:

- CITES
- ILO Convention
- ITTA
- UN Convention on Biological Diversity
- UN Framework Convention on Climate Change
- UN Convention to Combat Desertification

G5.2 Document that the project has approval from the appropriate authorities, including the established formal and/or traditional authorities customarily required by the communities.

Ecoplanet Bamboo Central America has acquired all legal land tenure to private property ownership of all land used in operations. This is filed both with our attorney in his office located in Managua, Nicaragua along with copies of land tenure located in the Rama office. We also have written

correspondence from the proper authorities authorizing project approval, which can be located in the main office and attorneys office.

G5.3 Demonstrate with documented consultations and agreements that the project will not encroach uninvited on private property, community property, or government property and has obtained the free, prior and informed consent of those whose rights will be affected by the project.

The project is being carried out on privately held land, owned by EcoPlanet Bamboo. The legal land title of the two unique proposed project areas are available on request.

Therefore the chance of the project encroaching outside of its project boundaries is minimal. In contrast, although the immediate project areas occur on private land, the social and environmental benefits are far reaching, beyond the scope of the project boundaries.

G5.4 Demonstrate that the project does not require the involuntary relocation of people or of the activities important for the livelihoods and culture of the communities. If any relocation of habitation or activities is undertaken within the terms of an agreement, the project proponents must demonstrate that the agreement was made with free, prior and informed consent and includes provisions for just and fair compensation.

The project is being carried out on land owned by the project proponents, and has historically for the past few decades been under private ownership used for small scale cattle grazing.

For Rio Siquia there were a total of 6 land owners mentioned below:

- Edwin Jose Fernandez
- Mirna Rosa Fernandez
- Maria A. Madriz
- Jose Andrez Fernandez
- Ricardo Fernandez
- Santos Barrera

In Rio Kama, the property was acquired from three different landowners:

- Roberto Urbina
- Marcos Aleman
- Gloria Judith Lopez

EcoPlanet Bamboo has a strict policy on land acquisition, detailed below.

## **STEP 1 LAND AND SELLER SCREENING**

Identify the property of interest: property has to meet certain requirements in order for to be considered further:

### **Land Requirements**

EcoPlanet Bamboo only acquires properties that meet the stringent eligibility requirements for carbon finance:

- Deforestation must have occurred more than 10years prior to acquisition, and a trend of increasing degradation since
- Land to be planted must not be categorized as “forest”.
- Forest and/or “woodland” cover on the property should be less than 25% of the total area
- Inherently low levels of biomass – grassland or shrubland with scattered trees is preferable

In addition:

- There must be communities within the vicinity that suffer from high levels of poverty, and that have the desire for employment
- We only consider large properties, no less than 250 acres as an initial purchase, in order to not affect small-scale farmers.

### **Seller Requirements**

In order to avoid leakage (i.e. buying land from landowners who will simply buy cheaper areas of existing forest and therefore contribute to further deforestation), EcoPlanet Bamboo ensures the following:

- Understand the seller: (where will the money go?) Get assurances that the money earned from his/her sale of the land will not lead to unsustainable farming, aggressive agriculture or deforestation elsewhere.
  - Although we cannot guarantee this, we are pro-active on selecting the right seller who we think will most likely be in compliance with our pre-purchase screening policy.
- Assurance that people depending on these lands for their livelihoods are not cut off from access to land, without being consulted, without adequate compensation and/or without providing them suitable alternatives.
- Assurance all stakeholders involved in sale of land are made aware of purchase as well as community leaders.
- Agree to undergo and assist a background check verifying land has clear title and traceability of previous uses within their property.

## **STEP 2: LEGAL DUE DILLIGENCE**

Once the agreement to buy has been made and both parties have signed a binding letter of intent or contract of sales agreement, the process of legal due diligence will begin and our attorney will check the following:

- Escritura (Title Deed): This document should be in the name of the current owners of the property and be duly registered
- Libertad de Gravaman (Free of Lien): This document shows if the property has any issues that might prevent/affect a legal sale of the property (such as previous promises of sale, mortgages, pending legal cases etc.
- Solvencia Municipal: This document provides the state of taxes on the property and lets us know whether all taxes have been paid up to date.
- Any additional property specific terms and conditions necessary or required by our lawyers are done.

## **STEP 3: CONCLUDING**

Once our legal counsel has reviewed these documents and assuming that the land has been cleared for sale, the next steps are mentioned below:

- A Title Deed will be drawn up by our lawyers showing the designated EcoPlanet Bamboo Group subsidiary, as the new owners.
- The seller of the property and a legal representative of EcoPlanet Bamboo will sign the new Title Deed, witnessed by our lawyers
- Instantly or as agreed upon, the funds for the purchase of the property will be transferred from the buyer to the seller

#### **STEP 4: POST PURCHASE**

Following the closing, our attorney will take the necessary steps to register the new title deed and documents with the appropriate governmental agencies.

Furthermore as there were no communities or habitation occurring on the project areas in the pre-project scenario, no relocation has occurred.

G5.5 Identify any illegal activities that could affect the project's climate, community or biodiversity impacts taking place in the project zone, and describe how the project will help reduce these activities so that project benefits are not derived from illegal activities.

Illegal activities that could affect the project's climatic, community or biodiversity impacts are:

- Illegal logging, hunting, fishing
- Leaching of chemicals and or improper use of chemicals
- Trash accumulation/dumping

All of these activities have been mitigated and all staff are aware of project protocols surrounding this. Trash is being accounted for by accumulating trash by category and taking it weekly to a recycling plant.

For more information on other mitigation activities please refer to risk and mitigation table above.

G5.6 Demonstrate that the project proponents have clear, uncontested title to the carbon rights, or provide

documentation demonstrating that the project is undertaken on behalf of the carbon owners with their full consent.

The project will be carried out on private land that EcoPlanet Bamboo acquired in early 2011. There are no residents within the project boundary. There are no ownership disputes with regard to the land. As the project is being developed under voluntary carbon markets, ownership of this carbon falls within the legal land owner and project developer, EcoPlanet Bamboo Group LLC.

According to the land tenure legislation in Nicaragua, EcoPlanet Bamboo holds legal title to the lands as per the public registry. As the legal owner of the project lands, the project entity has rights to the carbon assets and the emissions reduction certificates to be generated under the project.

Within the investment agreement that EcoPlanet Bamboo undertakes with its investors, it is clearly stated that all carbon rights remain under the ownership of the Company and that such finance emanating from the sale of delivered carbon credits will be utilized to meet Company debt within the project's early years, and for the long term continuance of social and environmental benefits thereafter.

---

---

## CL. CLIMATE SECTION

---

---

### CL1. NET POSITIVE CLIMATE IMPACTS

---

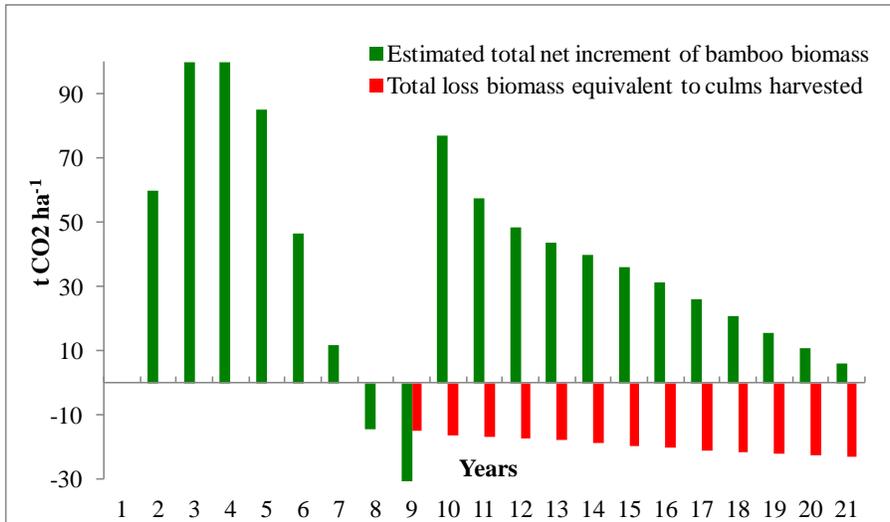
*The project must generate net positive impacts on atmospheric concentrations of greenhouse gases (GHGs) over the project lifetime from land use changes within the project boundaries.*

CL1.1 Use the methods of calculation, formulae and default values of the IPCC GPG or a more robust and detailed methodology to estimate the net change in carbon stocks due to the project activities. The net change is equal to carbon stock changes with the project minus carbon stock changes without the project (the latter having been estimated in G2). This estimate must be based on clearly defined and defensible assumptions about how project activities will alter carbon stocks or GHG emissions over the duration of the project or the project accounting period.

The actual net GHG removals by sinks are estimated using the equations of the consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM0001/ Version 05.1.1. Sectorial Scope 14, EB 60 (UNFCCC/CCNUCC. 2011). The reforestation activities in this project are promoted with the bamboo species *Guadua aculeata*, however as the information on this species is scarce, in the *ex ante* calculation of actual net GHG removals by sinks, information on *Guadua angustifolia* is used as a reference. Therefore, some parameters and models used for estimating carbon stock and changes in carbon were those employed for this bamboo species in previous studies, especially in Colombia.

The net change in carbon stocks is summarized below. These results are based off the analysis of biomass growth and therefore above and below ground carbon sequestration of the bamboo, changes in soil and litter carbon, and accounting for losses due to harvesting.

**Figure 21 Total net increment of carbon stocks in bamboo biomass**



The net anthropogenic GHG removals by sinks is the actual net GHG removals by sinks minus the baseline net GHG removals by sinks minus leakage. Therefore the following formula is used to calculate the net anthropogenic GHG removals by sinks:

$$C_{AR-VCS} = \Delta C_{ACTUAL} - \Delta C_{BSC} - LK$$

$C_{AR-VCS}$	Net anthropogenic GHG removals by sinks; tCO <sub>2</sub> -e
$\Delta C_{ACTUAL}$	Actual net GHG removals by sinks; tCO <sub>2</sub> -e
$\Delta C_{BSC}$	Baseline net GHG removals by sinks; tCO <sub>2</sub> -e
$LK$	Total emissions due to leakage; tCO <sub>2</sub> -e

The values of net anthropogenic GHG removals by sinks; tCO<sub>2</sub>-e by stratum and total are shown below. As the  $\Delta C_{BSC}$  and  $LK$  were estimated to be zero, therefore the values correspond to the actual net GHG removals by sinks; tCO<sub>2</sub>-e.

**Table 9 Net anthropogenic GHG removals by sinks ( $C_{AR-VSC}$ ); tCO<sub>2</sub>-e. Total and by ex ante project strata**

Project year	Year	Without trees (16,9 ha)				Low (893,2 ha)				Moderate ( 325,6 ha)				Total (1235,6 ha)
		$\Delta C_{ACTUAL}$	$\Delta C_{BS_c}$	$L_K$	$C_{AR-VSC}^*$	$\Delta C_{ACTUAL}$	$\Delta C_{BS_c}$	$L_K$	$C_{AR-VSC}^*$	$\Delta C_{ACTUAL}$	$\Delta C_{BS_c}$	$L_K$	$C_{AR-VSC}^*$	$C_{AR-VSC}$
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	1	1070,5	0	0	1070,5	57290,8	0	0	57290,8	20884,3	0	0	20884,3	79245,6
2013	2	2126,6	0	0	2126,6	113807,9	0	0	113807,9	41486,6	0	0	41486,6	157421
2014	3	2059,6	0	0	2059,6	110225,5	0	0	110225,5	40180,7	0	0	40180,7	152465,8
2015	4	1502,8	0	0	1502,8	80424,7	0	0	80424,7	29317,4	0	0	29317,4	111244,8
2016	5	838,5	0	0	838,5	44873,2	0	0	44873,2	16357,7	0	0	16357,7	62069,4
2017	6	250,6	0	0	250,6	13413,6	0	0	13413,6	4889,7	0	0	4889,7	18553,9
2018	7	-193,7	0	0	-193,7	-10368,6	0	0	-10368,6	-3779,7	0	0	-3779,7	-14342,0
2019	8	-612,3	0	0	-612,3	-32766,2	0	0	-32766,2	-11944,3	0	0	-11944,3	-45322,9
2020	9	1216,4	0	0	1216,4	65100,7	0	0	65100,7	23731,3	0	0	23731,3	90048,4
2021	10	883,8	0	0	883,8	47299,5	0	0	47299,5	17242,2	0	0	17242,2	65425,5
2022	11	728,9	0	0	728,9	39006,2	0	0	39006,2	14219,0	0	0	14219,0	53954,1
2023	12	641,2	0	0	641,2	34312,5	0	0	34312,5	12508,0	0	0	12508,0	47461,7
2024	13	570,2	0	0	570,2	30515,5	0	0	30515,5	11123,9	0	0	11123,9	42209,6
2025	14	493,5	0	0	493,5	26412,4	0	0	26412,4	9628,2	0	0	9628,2	36534,1
2026	15	409,0	0	0	409,0	21886,5	0	0	21886,5	7978,3	0	0	7978,3	30273,8
2027	16	315,9	0	0	315,9	16904,2	0	0	16904,2	6162,1	0	0	6162,1	23382,2
2028	17	222,6	0	0	222,6	11912,4	0	0	11912,4	4342,5	0	0	4342,5	16477,5
2029	18	127,5	0	0	127,5	6823,2	0	0	6823,2	2487,3	0	0	2487,3	9438,0
2030	19	39,4	0	0	39,4	2106,9	0	0	2106,9	768,0	0	0	768,0	2914,3
2031	20	-42,7	0	0	-42,7	-2286,6	0	0	-2286,6	-833,6	0	0	-833,6	-3162,9
<b>Total</b>		<b>12648,2</b>	<b>0</b>	<b>0</b>	<b>12648,2</b>	<b>676894,1</b>	<b>0</b>	<b>0</b>	<b>676894,1</b>	<b>246749,6</b>	<b>0</b>	<b>0</b>	<b>246749,6</b>	<b>936291,9</b>

\*= in the stratum

Full calculations can be found within the project proponents Project Document submission to the Verified Carbon Standard.

CL1.2 Estimate the net change in the emissions of non-CO2 GHG emissions such as CH4 and N2O in the with

and without project scenarios, if those gases are likely to account for more than a 5% increase or decrease (in terms of CO<sub>2</sub> equivalents) of the project's overall GHG emission reductions or removals over each monitoring period.

The CDM Executive Board agreed at its 42nd meeting held during 24-26 September in Bonn, Germany that GHG emissions in A/R CDM project activities from (i) fertilizer application, (ii) removal of herbaceous vegetation, and (iii) transportation may be considered as insignificant and hence can be neglected in A/R baseline and monitoring methodologies (<http://cdm.unfccc.int/EB/042/eb42rep.pdf>; p.6).

CL1.3 Estimate any other GHG emissions resulting from project activities. Emissions sources include, but are not limited to, emissions from biomass burning during site preparation, emissions from fossil fuel combustion, direct emissions from the use of synthetic fertilizers, and emissions from the decomposition of N-fixing species.

The site preparation method adopted for the project does not involve biomass burning. Herbaceous vegetation will be partially mowed before planting seedlings and during periodic maintenance. The mowed plants are left on site. The emission from this activity is not considered as in the conclusion by the CDM Executive Board cited in CL1.2.

All labour for the project activity are from local villages, hence the transportation need is minimal. All seedlings will be grown on site and transported to the planting sites by man-power/animal power. The conclusion by the CDM Executive Board cited in CL1.2 further supports that this is negligible.

CL1.4 Demonstrate that the net climate impact of the project is positive. The net climate impact is the net change in carbon stocks plus net change in non-CO<sub>2</sub> gases where appropriate minus any other GHG emissions resulting from project activities minus any likely project-related unmitigated negative offsite climate impacts (CL2.3).

**Figure 22 Net anthropogenic GHG removals by sinks ( $C_{AR-VSC}$ ); tCO<sub>2</sub>-e. Total and by ex post project strata\***

Project year	Year	$(C_{AR-VSC})$					Total (1235,6 ha)
		1 (16,8 ha)	2 (184,4 ha)	3 (708,8 ha)	4 (156 ha)	5 (169,6 ha)	
2011	0	0	0	0	0	0	0
2012	1	1076,9	11827,6	45466,4	10004,1	10879,6	79254,6
2013	2	2139,3	23495,5	90318,7	19873,1	21612,3	157438,9
2014	3	2072,0	22755,9	87475,7	19247,5	20932,0	152483,1
2015	4	1511,8	16603,6	63825,6	14043,7	15272,8	111257,4
2016	5	843,5	9264,0	35611,7	7835,7	8521,5	62076,4
2017	6	252,1	2769,2	10645,1	2342,3	2547,3	18556,0
2018	7	-194,9	-2140,6	-8228,6	-1810,6	-1969,0	-14343,7
2019	8	-615,9	-6764,6	-26003,5	-5721,6	-6222,4	-45328,0
2020	9	1223,7	13439,9	51664,4	11367,8	12362,7	90058,6
2021	10	889,1	9764,9	37537,2	8259,4	8982,2	65432,9
2022	11	733,2	8052,8	30955,6	6811,2	7407,3	53960,2
2023	12	645,0	7083,8	27230,7	5991,6	6516,0	47467,0
2024	13	573,6	6299,9	24217,3	5328,6	5794,9	42214,4
2025	14	496,5	5452,8	20961,1	4612,1	5015,8	36538,2
2026	15	411,4	4518,4	17369,3	3821,8	4156,3	30277,2
2027	16	317,8	3489,8	13415,3	2951,8	3210,1	23384,8
2028	17	223,9	2459,3	9453,8	2080,1	2262,2	16479,3
2029	18	128,3	1408,6	5415,0	1191,5	1295,7	9439,1
2030	19	39,6	435,0	1672,1	367,9	400,1	2914,7
2031	20	-43,0	-472,1	-1814,7	-399,3	-434,2	-3163,3
<b>Total</b>		12.724,0	139.743,9	537.188,1	118.198,8	128.543,2	936.398,0

\* 1=without trees and 6,25 m x 6,25 m; 2= low and 5 m x 5m; 3= low and 6,25 m x 6,25 m; 4= moderate and 5 m x 5m; 5= moderate and 6,25 m x 6,25 m.

CL1.5 Specify how double counting of GHG emission reductions or removals will be avoided, particularly for offsets sold on the voluntary market or generated in a country with an emissions cap.

The GHG emission reductions associated with the proposed project activities are being developed under the Verified Carbon Standard. All credits will be sold through one of the VCS's registries. Therefore no double accounting will occur.

Nicaragua does not have an emissions cap or any national accounting of emissions. Therefore the

emissions reductions associated with the project will not be accounted for at any level other than under the VCS project within which they are submitted for validation and verification.

## CL2. OFFSITE CLIMATE IMPACTS (“LEAKAGE”)

---

*The project proponents must quantify and mitigate increased GHG emissions that occur beyond the project area and are caused by project activities (“leakage”).*

CL2.1 Determine the types of leakage expected and estimate potential offsite increases in GHGs (increases in emissions or decreases in sequestration) due to project activities. Where relevant define and justify where leakage is most likely to take place.

Under the applicability conditions of this methodology leakages could occur and therefore GHG emissions due to activity displacement. In the specific case of this project, a displacement of grazing activities caused by the implementation of project activities could occur. According to the Tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity” leakage is calculated as:

$$LK_t = LK_{GRAZING,t}$$

where:

$LK_t$  GHG emissions due to leakage, in year  $t$ ; t CO<sub>2</sub>-e

$LK_{AGRIC,t}$  Leakage due to the displacement of grazing activities in year  $t$ , as calculated in the tool “Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity (UNFCCC/CCNUCC. 2009a); t CO<sub>2</sub>-e

It is important to note that according to the analyses conducted out in the baseline, when actual net GHG removals by sink were evaluated it was determined that there is no potential displacement of grazing activities, as the cows were slaughtered and not moved or replaced.

Therefore, the “Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant” (UNFCCC/CCNUCC. 2009b) were applied in order to determine whether the increase in emissions of greenhouse gases due to displacement of pre-project grazing activities attributable to the A/R CDM project activity is insignificant and may be accounted as zero.

The increase in GHG emissions due to displacement of pre-project grazing activities attributable to the A/R CDM project activity is insignificant if at least one of four conditions is met. The conditions established are:

- a) Total area subjected to pre-project grazing activities to be displaced is less than 5% of the area of the entire A/R CDM project activity, or less than 50 ha;
- b) The total area expected to be displaced is more than 5% of the entire A/R CDM project activity or more than 50 ha, and the n-a ha (where “n” is the area in ha expected to be displaced and “a” is 5% of the total project areas or 50 ha) are displaced to:
  - Areas of land that can be identified as degraded or degrading. The identification shall be conducted using the most recent version of the “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities”; and/or
  - Existing grasslands with the carrying capacity that allows for accommodation of the displaced animals during the entire period of displacement;
- c) Total number of animals expected to be displaced is not more than 40 LSU;
- d) The total number of animals expected to be displaced is more than 40 LSU, and the n-40 LSU (where: “n” is the total number of animals, expressed in LSU, which are expected to be displaced) are displaced to:

- Areas of land that can be identified as degraded or degrading. The identification shall be conducted using the most recent version of the “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities”; and/or
- Existing grasslands with the carrying capacity that allows for accommodation of the displaced animals during the entire period of displacement; and/or
- Existing tree plantations, where at least 60% of trees are expected to have DBH greater than 10 cm at the time of displacement and with the carrying capacity that allows for accommodation of the displaced animals during the entire period of displacement; and/or
- Feed-lots or other zero-grazing systems; and/or
- Slaughterhouses.

Concerning to the conditions established in the guidelines, the displacement of pre-project grazing activities in A/R CDM project activity is insignificant. The number of cows which could have been displaced is very small (about 50), these animals were conducted directly to be slaughtered and if for any reason were displaced the surrounding areas of the project boundary have the same level of degradation defined previously in the “Tool for the identification of degraded or degrading lands for consideration in implementing CDM A/R project activities”.

CL2.2 Document how any leakage will be mitigated, and estimate the extent to which such impacts will be reduced by these mitigation activities.

No such leakage is anticipated and therefore mitigation measures are not necessary.

CL2.3 Subtract any likely project-related unmitigated negative offsite climate impacts from the climate benefits being claimed by the project and demonstrate that this has been included in the evaluation of the net climate impact of the project (as calculated in CL1.4).

No anticipated leakage means that no such negative climate impacts need to be included within the evaluation of the net climate impact.

CL2.4 Non CO2 gases must be included if they are likely to account for more than a 5% increase or decrease (in CO2e) of the net change calculations (above) of the project's overall off-site GHG emissions reductions or removals over each monitoring period.

The project does not include any significant non CO2 gases and therefore there is no such inclusion within the associated calculations.

### **CL3. CLIMATE IMPACT MONITORING**

---

*Before a project begins, the project proponents must have an initial monitoring plan in place to quantify and document changes in project-related carbon pools, project emissions and non-CO2 GHG emissions if appropriate, (within and outside the project boundaries). The monitoring plan must identify the types of measurements, the sampling method and the frequency of measurement.*

*Since developing a full carbon-monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being validated against the Standards. This is acceptable as long as there is an explicit commitment to develop and implement a monitoring plan.*

CL3.1 Develop an initial plan for selecting carbon pools and non-CO2 GHGs to be monitored, and determine the frequency of monitoring.

Potential pools include aboveground biomass, litter, dead wood, belowground biomass, wood products, soil carbon and peat. Pools to monitor must include any pools expected to decrease as a result of project activities, including as a result of leakage.

A plan must be in place to continue leakage monitoring for at least 5yrs after all activity displacement or other leakage causing activity has taken place. Individual GHG sources may be considered 'insignificant' and do not have to be accounted for, if together such omitted decreased in carbon pools and increases in GHG emissions amount to less than 5% of the total CO2e benefits generated by the project. Non CO2 gases must be included if they are likely to account for more than 5% (in terms of CO2e) of the projects overall GHG impact over each monitoring period. Direct field measurements using scientifically robust sampling must be

used to measure more significant elements of the projects carbon stocks. Other data must be suitable to the project site and specific forest type.

The monitoring plan is developed according to the consolidated afforestation and reforestation baseline and monitoring methodology AR-ACM0001/ Version 05.1.1. Sectorial Scope 14, EB 60 (UNFCCC/CCNUCC. 2011).

Therefore, all data collected as part of monitoring shall be archived electronically and shall be kept at least for two years after the end of the last crediting period. All measurements should be conducted according to relevant standards in forest inventory and the provisions contained in the tools used in this methodology apply (UNFCCC/CCNUCC. 2011). However, specific adjustments will be done taking into account that the species of interest is a bamboo.

The mensuration, sampling design and the parameters or variables to be assessed when the monitoring plan is implemented, correspond to those used for estimating growth, productivity, carbon stock and changes in carbon in bamboo species, especially in Colombia. However, because of the similarities between the bamboo species these approaches can be applied in order to obtain proper information to determine GHG removals and probable emissions resulting from project activities.

Hence, the purpose of monitoring is to gather information on the bamboo plantation within project areas and strata. Thus, information about growth, GHG (removals and emission) and on the project management activities will support the estimation of VERs at the end of the accreditation period.

The monitoring is considered a continue process which should be implemented during the all stages required for establishing and managing a bamboo plantation, that means throughout the life of the plantation and according to the occurrence of management activities.

### **Description of the monitoring plan**

In order to guarantee the quality of the information collected in the monitoring plan a standard operating procedure (SOP) will be defined and supported with inventory approaches developed for bamboo species and also those from the IPCC GPG LULUCF (2003), which can be applied to bamboo plantations. Also, statistical criteria and the principles of forest inventory will be utilised as a quality control/quality assurance (QA/QC) procedures for inventory operations, including field data collection and data management.

The definition of SOP is supported by different stages of the monitoring plan defined in the next items, where different strategies are developed to guarantee a proper collection and processing of data.

Monitoring will be conducted by a professional team consisting of a coordinator (preferably bamboo expert), a field technician and a data analyst. The coordinator will report directly to the project manager of EcoPlanet Bamboo. It is expected that activities of monitoring be implemented according to the monitoring plan, therefore the personnel involved in this process will be trained in order to comply with the SOP defined in the plan.

Monitoring will occur for each of the ex post strata, of which 5 have been defined, based on 2 parameters:

- (1) The density of trees in the baseline condition
- (2) The density of planting

**Table 10 Ex post strata and total areas**

Strata	Trees (ha <sup>-1</sup> )	Tree density	Spacing	Total Area (ha)	Siquia farm (ha)	Kama farm (ha)
1	0	Without trees	6,25 x 6,25 m	16,79		16,79
2	1 -50	Low	5 x 5 m	184,4	57,72	126,68
3			6,25 x 6,25 m	708,85	46,58	662,27
4	> 50	Moderate	5 x 5 m	155,97	155,97	
5			6,25 x 6,25 m	169,62	130,68	38,94

### Sampling design

As strata were previously defined supported on two criteria that could influence the variables of interest, this is a strong argument to define the *stratified sampling* as the design chosen to be implemented during the monitoring plan.

In stratified sampling the population is partitioned into strata and the sample is selected by a specific design within each strata. Due to the fact that the selection within strata is independently done, the

variances of strata estimators can be added in order to obtain the variances estimators of the whole population (Thompson 1992). This represents a possibility in increasing precision by means of decreasing the population variance (Akça 2000).

The specific sampling design to be applied within the monitoring plan would be the *stratified random sampling*. Thus the units of the population are grouped together on the basis of similarity of certain characteristics (Akça 2000). The homogeneity in this case is represented by the criteria used to define the strata (tree density and plantation spacing).

Some advantages of the stratified random sampling are remarked by Akça (2000):

- Stratification can generate a lower interval of the error of estimation than would be produced by a simple random sampling of the same size.
- Cost reduction per observation in the survey as a result of the stratification into homogeneous groups.
- Separate estimates of population parameters within each stratum

According to Camargo et al. (2008) for this sampling design there are unbiased estimators that also can be employed to know the characteristics of the population analysed and to produce estimates of the variables being assessed.

The mean of the population is defined as:

$$\bar{y} = \frac{\sum_{h=1}^H N_h \bar{y}_h}{N} = \sum_{h=1}^H W_h \bar{y}_h$$

Where;

$\bar{y}$  : the sample mean of the population

$N$ : size of the population

$N_h$ : size of the population in the stratum  $h$

$W_h$ : relative weight of the population in the stratum  $h$

$\bar{y}_h$  : the sample mean of the population in the stratum  $h$

$H$ : Total number of strata

The variance ( $V$ ) of the estimation is defined as:

$$V(\bar{y}) = \sum_{h=1}^H W_h^2 V(\bar{y}_h) \text{ and } V(\bar{y}_h) = \frac{S_h^2}{n_h} \left(1 - \frac{n_h}{N_h}\right)$$

Where;

$\bar{y}$  : the sample mean of the population

$\bar{y}_h$  : the sample mean of the population in the stratum  $h$

$W_h$ : relative weight of the population in the stratum  $h$

$N_h$ : size of the population in the stratum  $h$

$S_h^2$  = Variance of population in the stratum  $h$

$n_h$ : Size of the sample in the stratum  $h$

$H$ : Total number of strata

The standard error ( $SE$ ) of the estimation is defined as:

$$SE_{\bar{y}} = \sqrt{\sum_{h=1}^H W_h^2 \left(1 - \frac{n_h}{N_h}\right) \frac{S_h^2}{n_h}}$$

$W_h$ : relative weight of the population in the stratum  $h$

$N_h$ : size of the population in the stratum  $h$

$S_h^2$  = Variance of population in the stratum  $h$

$n_h$ : Size of the sample in the stratum  $h$

$H$ : Total number of strata

The confidence interval of the estimation is defined as:

$$\bar{y} \pm t_{\alpha/2} SE_{\bar{y}}$$

Where;

$\bar{y}$  : the sample mean of the population

$SE_{\bar{y}}$  : The standard error of the estimation

$t_{\alpha/2}$ : is the  $t$  value (two tailed) with  $n-H$  degrees of freedom

$H$ : Total number of strata

The sampling error  $e$  may be defined from the previous confidence interval equation:

$$e = t_{\alpha/2} SE_{\bar{y}} \quad \text{ó} \quad \%e = \frac{t_{\alpha/2} SE_{\bar{y}}}{\bar{Y}} \times 100$$

Where;

$\bar{y}$  : the sample mean of the population

$SE_{\bar{y}}$  : The standard error of the estimation

$t_{\alpha/2}$ : is the  $t$  value (two tailed) with  $n-H$  degrees of freedom

$H$ : Total number of strata

The maximum allowable **relative margin of error** of the mean for estimation of bamboo biomass defined in the project and specifically in this monitoring plan is  $\pm 10\%$  at 90% confidence level. In order to determine the level of uncertainty of the data obtained in the project this value of error will be used here as a way of quality control (QC) and quality assurance (QA).

### Plot design

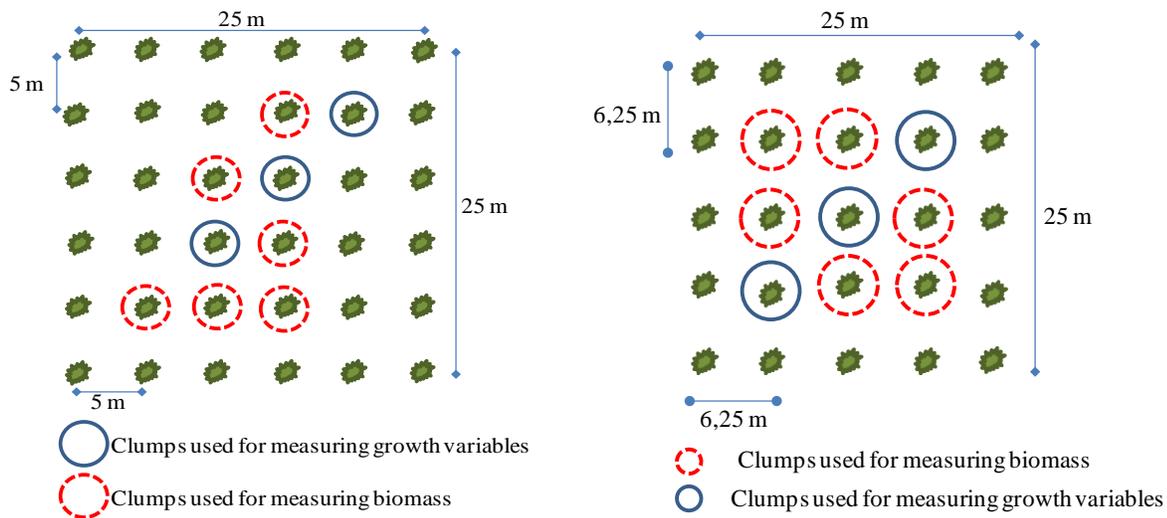
Some studies (Camargo 2006, Schumacher 2006, Rijal 2006 and Camargo et al. 2008) have been carried out in order to define an optimal plot design for bamboo inventory, especially with the bamboo species *Guadua angustifolia* Kunth.

In these studies circular plots are showed as one of the better alternative; however limitations associated with their establishment within bamboo forest represent a high effort, a high time consuming and consequently high costs. Therefore, for the monitoring plan are proposed square plots which according to the above mentioned studies should have at least 50 m<sup>2</sup>.

Taking into account the plantation spacing and the possibility of having an adequate number of clumps to be assessed during monitoring, the size of the plots will be of 625 m<sup>2</sup> for all strata. Additionally, an

effective plot size is also defined within the area where the clumps to be assessed are located. This procedure is applied to avoid any possibility of interference between nearby plots that may affect the variables of interest. The below figure depicts the plot to be employed in the monitoring plan. The area corresponding to the clumps to be measured (growth and biomass) represents the effective plot.

**Figure 23 Depiction of sample plots for monitoring activities**



After calculating the sample size, the plots selected within each stratum will be permanent and monitoring always will be conducted out on these along of the project life. The random process to choose these sampling plots will consists of two steps. First, a grid with the size of plots according to the stratum (25 x 25 m pixels) will overlay on the digital map of the project areas, considering only the effective area or not covered by forests. Digital map is obtained from RapiEye images, taken in 2010 and with resolution of 5 m.

Then, by using the tool Hawth's extension of the software ArcMap 9.2, the points correspond to the pixels centroid and equivalent to the plots will be marked in order to install the plots from this point. Thereafter, the coordinates of each point will be registered and subsequently uploaded in a GPS, which will be used to find each point in field. Points selected, will be used to define the centre for establishing each square sample plot. The calculation of sample size will be explained later when details about mensuration or calculation of parameters will be described.

As bamboo species have a specific growth pattern, in order to describe their growth the measurements

are done on the largest and usually the youngest culm per clump, because the culms have no diameter increment and as their elongation occurs fast the total length is reached approximately six months after they emerge (Camargo 2006). Therefore, principles of bamboo forest inventory and mensuration will be applied as a measured of quantity control (QC) and quality assurance (QA) according to the approaches defined by Camargo (2006), Camargo et al. (2008); Camargo et al. (2010) and Camargo and Kleinn (2010).

**Table 11 Data and parameters for the monitoring of bamboo growth and dynamics**

Data or parameter	Unit	Description	Monitoring frequency	QA /QC
Basal diameter ( $d_b$ )	cm	Measured on the middle of first internode of the highest culm per clump	Annually	Measured on the indicated clumps of the selected permanents plots. Margin of error.
Diameter at the middle of internode at breast height ( $dbh$ )	cm	Measured on the middle of the internode at breast height (1,3 m) of the highest culm per clump. This parameter will be measured only after the third year when is expected that most of youngest culms are higher than 1,3 m.	Annually	Measured on the indicated clumps of the selected permanents plots. Margin of error.
Culm length ( $l$ )	m	Measured on the highest culm per clump	Annually	Measured on the indicated clumps of the selected permanents plots. Margin of error.
Number of culms per clump ( $N_{CP}$ )	Number	Accounted on the clumps	Annually	Accounted on the clumps of the selected permanents plots. Margin of error.
Number of new culms ( $N_{SH}$ )	Number	Accounted on the clumps	Annually	Accounted on the clumps of the selected permanents plots. Margin of error.
Dead culms ( $d_c$ )	Number	Accounted on the clumps	Annually	Accounted on the clumps of the selected permanents

				plots. Margin of error.
--	--	--	--	-------------------------

**Table 12 Data and parameters to be monitored for carbon analysis**

Data or parameter	Unit	Description	Monitoring frequency	QA /QC
Basal diameter ( $d_b$ )	cm	Measured on the middle of first internode of three culms randomly selected from clumps for destructive sampling	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Measured on the indicated clumps of the selected permanents plots. Margin of error.
Diameter at the middle of internode at breast height ( $dbh$ )	cm	Measured on the middle of the internode at breast height (1,3 m) of three culms randomly selected from clumps for destructive sampling,	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Measured on the indicated clumps of the selected permanents plots. Margin of error.
Diameter at the middle of the highest internode ( $d_h$ )	cm	Measured on the middle of the highest internode of three culms randomly selected from clumps for destructive sampling,	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Measured on the indicated clumps of the selected permanents plots . Margin of error.
Wall thickness ( $W_t$ )	cm	Measured at three different points of three culms randomly selected from clumps for destructive sampling (at first internode, at the middle and at the highest internode)	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Measured on the indicated clumps of the selected permanents plots. Margin of error.
Culm length ( $l$ )	m	Measured on the three culms randomly selected from clumps for destructive sampling (at first internode, at the	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Measured on the indicated clumps of the selected permanents plots . Margin of error.

Data or parameter	Unit	Description	Monitoring frequency	QA /QC
		middle and at the highest internode)		
Culm volume ( $V_c$ )	$m^3$	Calculated from length, diameter and wall thickness of the three culms randomly selected from clumps for destructive sampling	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Culms from the indicated clumps of the selected permanent plots. Margin of error.
Basic bamboo wood density ( $\rho$ )	$t m^{-3}$	Calculated from samples of the three culms randomly selected from clumps for destructive sampling according to the ISO TR 22157-1/2. (2004)	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Culms from the indicated clumps of the selected permanent plots. Margin of error.
Dry biomass ( $B_d$ )	t	Calculated from the three culms randomly selected from clumps for destructive sampling, including leaves, branches, culm and rhizome*	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Culms from the indicated clumps of the selected permanent plots. Margin of error.
Rhizome - culm ratio ( $R_c$ )	Dimensionless	Rhizome - Culm biomass ratio calculated from values of rhizome biomass and culm biomass of culm used for destructive sampling	At Year 5 <sup>th</sup> after the establishment	Culms from the indicated clumps of the selected permanent plots
Biomass expansion factor ( $BEF_b$ )	Dimensionless	Biomass expansion factor for conversion of culm biomass to above-ground biomass	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Culms from the indicated clumps of the selected permanent plots

Data or parameter	Unit	Description	Monitoring frequency	QA /QC
Allometric functions ( $f(DBH;l)$ )	t	Allometric function for <i>Guadua aculeata</i> fitted from diameter and length by means of regressions analyses	At Year 5 <sup>th</sup> and Year 10 <sup>th</sup> after the establishment	Statistics as Mean square error and those used i.e. in Camargo and Kleinn (2010)
Litter carbon ( <i>Li</i> )	t	Estimated from four random samples taken with a 0,5 x 0,5 m frame from permanent plots	At Year 10 <sup>th</sup> and Year 20 <sup>th</sup> after the establishment	Samples processed in a lab with standard methods. Margin of error.
Soil organic carbon ( <i>SOC</i> )	t	Estimated from four random samples taken at 0,5 m of depth at permanent plots. Bulk density is also measured by using cylinders of known volume IPCC GPG LULUCF (2003)	At Year 10 <sup>th</sup> and Year 20 <sup>th</sup> after the establishment	Samples processed in a lab with standard methods. Margin of error.

\*= rhizome biomass only will be measured in one culm per permanent plot selected at year 5<sup>th</sup> after the establishment. Thereafter, only the ratio rhizome culm biomass will be employed to estimate the biomass

CL3.2 Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

The full monitoring plan, as per the accepted CDM A/R methodology is detailed above.

---

---

## CM. COMMUNITY SECTION

---

---

### CM1. NET POSITIVE COMMUNITY IMPACTS

---

*The project must generate net positive impacts on the social and economic wellbeing of communities and ensure that costs and benefits are equitably shared among community members and constituent groups during the project lifetime. Projects must maintain or enhance the High Conservation Values (identified in G1) in the project zone that are of particular importance to the communities' well being.*

CM1.1 Use appropriate methodologies to estimate the impacts on communities including all socio-economic or cultural groups such as indigenous people resulting from planned project activities. A credible estimate of impacts must include changes in community wellbeing due to project activities and an evaluation of the impacts by affected groups. This estimate must be based on clearly defined and defensible assumptions about how project activities will alter social and economic wellbeing including potential impacts of changes in natural resources and ecosystem services identified as important by communities over the duration of the project. The “with project” scenario must then be compared with the “without project” scenario of social and economic wellbeing in the absence of the project (completed in G2). The difference (i.e. community benefit) must be positive.

EcoPlanet Bamboo aims to become a force of positive socio-economic impact in the regions where it operates. A number of measures are being taken by EcoPlanet Bamboo to ensure that not only the standard of living of its employees will be improved, but also the community at large.

RAAS has traditionally received little attention with regards to economic development and the opportunities for stable employment are relatively low. Only 43% of the population has permanent employment, the rest being either temporary employed or unemployed. The ranges of income reported by most workers and producers are 62.1% of the population at C\$ 2001 to C\$ 4000 and only 24.2% of the population at C\$ 500 to C\$ 2000 (1US\$=C\$22.5). The project compensates workers far above this the salary range, also giving employees fringe benefits that will help them contribute to their personal development such as social security.

During the first stage of land preparation and plantation development EcoPlanet Bamboo will provide short-term employment and cash flow to a large number of members from surrounding communities. EcoPlanet Bamboo supplied full-time employment to plantation workers, nursery personnel and security and maintenance staff.

Currently only 5.1% of the workforce in El Rama is composed of females, whereas they compose 58% of the economically inactive population. EcoPlanet Bamboo is an equal rights employer and is committed to keeping a high percentage of female employees.

### **Improved land management**

EcoPlanet Bamboo's management and stakeholders have a long history and connection with the Rama area, and over the years have been involved in a number of initiatives within the area. EcoPlanet Bamboo intends to build on these relationships and experience to utilize its extensive agronomy and natural resource management expertise to carry out training and awareness building as well as provide support for local initiatives across the Rama area. These may include local government initiatives as well as education/alphabetization and health campaigns in the future.

EcoPlanet Bamboo is committed to put 30-50% of carbon finance in to a development fund, to be managed by a stakeholder committee. This will be made up of chosen representatives both from within EcoPlanet Bamboo's work force, and the surrounding communities. EcoPlanet Bamboo has a dedicated staff member to work within this committee to develop proposed development plans for the direct area. Carbon funds will be utilized to finance such development, with a focus on education, health and improved opportunities for economic diversification.

Full details of the project's community impact monitoring are available in CM3.1 below.

CM1.2 Demonstrate that no High Conservation Values identified in G1.8.4-6 will be negatively affected by the project.

The project proponents carried out a full socio-economic baseline assessment of the proposed project areas, prior to the initiation of project activities. Any HCV sites were identified and operating

procedures enacted to ensure their maintenance.

Such sites are limited to a cemetery located 200m away from the Rio Siquia River on the south end of the farm next to the access road. The cemetery is approximately 12m x 5m and is open to family members.

This area is always kept clean and with uttermost attention and respect to its cultural value. No planting of bamboo occurs within these areas. Signs have been set around the cemetery prohibiting planting and disrespectful treatment.

## **CM2. OFFSITE STAKEHOLDER IMPACTS**

---

*The project proponents must evaluate and mitigate any possible social and economic impacts that could result in the decreased social and economic well-being of the main stakeholders living outside of the project zone, resulting from project activities. Project activities should at least 'do no harm' to the well-being of offsite stakeholders.*

CM2.1 Identify potential negative offsite stakeholder impacts that the project activities are likely to cause.

EcoPlanet Bamboo Central America does not believe that the proposed project activities will have any potential negative impacts on offsite stakeholders. In contrast, studies show that the increased improvement of livelihoods within the direct project areas will have a trickle down effect within the surrounding areas, leading to improved infrastructure, employment and other socio-economic benefits.

CM2.2 Describe how the project plans to mitigate these negative offsite social and economic impacts.

EcoPlanet Bamboo does not anticipate needing to mitigate offsite negative social and economic impacts. However, if such impacts occur throughout the lifetime of the project, EcoPlanet Bamboo will undertake

necessary measures to address these.

CM2.3 Demonstrate that the project is not likely to result in net negative impacts on the well-being of other stakeholder groups.

The proposed project activities are expected to result in positive impacts on all identified stakeholder groups.

### **CM3. COMMUNITY IMPACT MONITORING**

---

*The project proponents must have an initial monitoring plan to quantify and document changes in social and economic wellbeing resulting from the project activities (for communities and other stakeholders). The monitoring plan should indicate which communities and stakeholders will be monitored, and identify the types of measurements, the sampling method and the frequency of measurement.*

*Since developing a full community-monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being evaluated against the Standards. Is acceptable as long as there is an explicit commitment to develop and implement a monitoring plan.*

CM3.1 Develop an initial plan for selecting community variables to be monitored, and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's community development objectives and anticipated impacts (positive and negative).

#### **CALDERON COMMUNITY ANALYSIS**

A socio-economic study was carried out as part of the Environmental Impact Study, and is based on the characterization of the municipality of El Rama and on the outcome of the 74 surveys conducted in communities surrounding the farm of Siquia River project. The main social problems that indicate the data taken from the surveys are:

### **El Areno Community (Rio Siquia Farm)**

#### **Employment**

Permanent workers (in economically active pop.)	57%
Temporary workers in total (in EAP)	43%
Women with permanent Jobs	9.5%
Women as Housewives	86%

#### **Education**

Third grade education level	43%
Illiterate	16%

#### **Housing**

Dirt Floors	91%
6 or more occupants	44.6%
Use of Outdoor Latrines (Open Pits)	93.2%
Lack Electricity	83.8%

#### **Environment**

Belongs to environment preservation organization	37.8%
Unaware of Natural Disaster Protection Center	95.9%

### **LA FONSECA COMMUNITY ANALYSIS**

The socio-economic study is part of the Environmental Impact Study, and is based on the characterization of the municipality of El Rama and in the results of 32 surveys taken in the community of La Fonseca, round about the estate of the Kama River project. The main social problems indicated in the data collected from the survey are:

#### **La Fonseca Community (Rio Kama Farm)**

##### **Employment**

Permanent workers (in economically active pop.)	63%
Temporary workers in total	36.8%
Women with permanent Jobs	13.2%
Women as Housewives	83.8%

##### **Education**

Third grade education level	36%
-----------------------------	-----

Illiterate	7.9%
<b>Housing</b>	
Dirt Floors	53.1%
6 or more occupants	28.1%
Use of Outdoor Latrines (Open Pits)	100.0%
Lack Electricity	12.5%
<b>Environment</b>	
Belongs to environment preservation organization	31.2%
Unaware of Natural Disaster Protection Center	71.9%

### **Socio-economic impacts of the project**

The project aims to achieve positive socio-economic impacts, direct and indirect, that would benefit the families of the communities located in the area of influence of the Siquia River farm.

- Creation of temporary jobs
- Creation of permanent jobs
- Supply of liquidity
- Service of transportation of inputs and outputs
- Transfer of technology
- Maintenance of Roads
- Training
- Women's empowerment.

### **MONITORING PLAN**

Verification of the socio-economic impact will be conducted periodically in the neighboring communities in the area of influence and can be used primary data, which is recommended for conducting surveys and semi-conducted interviews, religious leaders and main social actors. Also, it will be possible to use the secondary information that can be provided by the municipal government and the governmental institutions in the municipality of El Rama.

It is important to considering the verification of the socio-economic impacts the real conditions under which the Project was developed during the evaluation period, as the external environment may be

beyond the control of the company and affect the expected outcomes or projected results.

**Table 13 Monitoring Plan**

Social Problem	Objective of the impact	Target Population	Verification	Periodicity	Valid Assumptions
High unemployment	Create temporary jobs	Men and women in the community	Company payrolls	Bi-Annual (every six months/twice a year)	Unfavorable environmental conditions for the implementation of the project
Low level of women empowerment	Study Focal Groups	Women working in the project	Attendance to workshops	Bi-Annual	Discouraged women to participate in the project
Low technological level of workers	Training to staff about technological issues	Employees and workers of the project	Attendance to workshops	Annual	Low IQ
Low level of agricultural technology	Transference of technology to producers men/women	Small producers in the community	Attendance to workshops	Annual	Producers (men/women) with very low interest to participate

### Social Impact Indicators

In order to verify the impact of the projects, EcoPlanet Bamboo has identified the following social indicators to be monitored and reported on.

**Table 14 Social impact monitoring indicators**

Variable	Indicator	Means of Verification
<b>Employment</b>	Number of jobs created	Company Payroll determines number of workers
	Total number of skilled jobs created	Company Payroll determines number of skilled workers
	% or absolute increase in household income from project activities	Company Payroll determines the increase in income based on salaries
	Number of jobs created in the formal sector with employees eligible for social security - 100% of jobs in the project should be created in the formal sector	Company payroll to determine that the number of employees on the official payroll matches the number of employees on the farm.
<b>Equal Opportunity Employment</b>	% of women employed	Company Payroll determines number of female workers
	% of handicapable persons employed	Company Payroll determines number of handicapable workers

	HR Policies on equal opportunity employment	Policies are available in the company's office.
<b>Capacity Building</b>	Total number trainings conducted	List of workshops as updated annually in the management plan
	Total number of employees who have attended these trainings in relation to the entire workforce	Attendance lists of workshops compared to the number of workers as determined by company payroll
	# of employees who have received technical training	Attendance lists of workshops.
<b>Literacy Levels</b>	% of literate workers	Interviews, surveys, assessments
	No. of workers attending literacy workshop	Attendance lists of workshops.
<b>Empowerment amongst women, community &amp; workers</b>	# of female workers trained as a percentage of the company's entire female work force	Attendance lists of workshops
	# of stakeholder activities to include the community in operations and allow them to express their views	Record of list of activities as on file at the company's office.
	# of workers who feel their lives have changed since working with EcoPlanet Bamboo	Interviews, surveys, assessments
<b>Enterprise Development</b>	# micro and medium enterprise developed with carbon finance	Project data as well as surveys, assessments to be conducted once carbon finance is paid out.
	# of bamboo enterprises developed	Surveys and assessments of the local market

CM3.2 Develop an initial plan for how they will assess the effectiveness of measures used to maintain or enhance HCVs related to community well being (G1.8) present in the project zone.

As the project is implemented on privately owned land, there are no community related HCVs within the project area. However there are disenfranchised communities in the project zone for whom the project will positively impact. The project area is defined by the boundaries of the project zone as stated in section G1.3.

CM3.3 Commit to developing a full monitoring plan within 6 months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

EcoPlanet Bamboo is committed to providing annual reports to its shareholders and investors on its triple bottom line objectives. This includes an assessment of positive biodiversity and environmental impacts that are monitored against the factors as defined within the biodiversity baseline. These results will be made available on the company websites, and within annual reports.

---

---

## **B. BIODIVERSITY SECTION**

---

---

### **B1. NET POSITIVE BIODIVERSITY IMPACTS**

---

*The project must generate net positive impacts on biodiversity within the project zone and within the project lifetime, measured against the baseline conditions. Projects should maintain or enhance any HCVs (identified in G1) present in the project zone that are of importance in conserving globally, regionally or nationally significant biodiversity.*

*Invasive species populations must not increase as a result of the project, either through direct use or indirectly as a result of project activities. Projects may not use Genetically Modified Organisms (GMOs) to generate GHG emissions reductions or removals. GMOs raise unresolved ethical, scientific and socio-economic issues.*

B1.1 Use appropriate methodologies to estimate changes in biodiversity as a result of the project in the project zone and in the project lifetime. This estimate must be based on clearly defined and defensible assumptions. The “with project” scenario should then be compared with the baseline “without project” biodiversity scenario completed in G2. The difference (i.e., the net biodiversity benefit) must be positive.

The project proponents hired the services of a professional specialist firm, Fiallos Associates, to carry out a full biodiversity assessment as part of the EIA. This included a baseline assessment of biodiversity found within the project areas – the full results of which can be found in Annex A. The project areas are defined by the boundaries of the project zone as stated in section G1.3. This biodiversity represents the ‘without project scenario’ as a static baseline. However, in reality this biodiversity would continue to decrease and in the absence of the project would continue to decline, in line with current trends of increasing land use change and land degradation.

The project activities are designed to occur around existing remaining biodiversity and areas of high conservation forest, and enhance this biodiversity. The project proponents believe that once a canopy cover is established with *Guadua aculeata* interspersed with mature standing trees, the biodiversity within the project areas will continue to increase over time.

The project proponents are committed to carrying out a full biodiversity assessment of all project areas every five years, in order to assess, against the 2011 baseline, positive and negative changes in biodiversity.

**B1.2 Demonstrate that no HCVs identified in G1.8 will be negatively affected by the project.**

All staff are aware of high conservation areas both by numerous signs around the area as well as maps in all plantation offices. The supervisors and farm directors are responsible for informing all staff of these zones. Guards are also on watch and are aware that these zones are protected.

More details can be found in section G3.6 above.

**B1.3 Identify all species to be used by the project and show that no known invasive species will be introduced into any area affected by the project and that the population of any invasive species will not increase as a result of the project.**

No invasive species will be used by the project proponents. The project uses only *Guadua aculeata*, a species of bamboo that is not only naturalized to Nicaragua, but is also found growing wild across the project zone. *Guadua aculeata* is a clumping form of bamboo, whose rhizomes form distinct systems below the surface of the ground, but do not spread beyond that area.

**B1.4 Describe possible adverse effects of non-native species used by the project on the region's environment, including impacts on native species and disease introduction or facilitation. Project proponents must justify any use of non-native species over native species.**

No non native species have been used for the proposed project activities.

B1.5 Guarantee that no GMOs will be used to generate GHG emission reductions or removals.

EcoPlanet Bamboo Central America has used seed from parent *Guadua aculeata* plants growing wild in Nicaragua to generate all activities that result in emission removals. There has been no use of any GMOs within the project.

## **B2. OFFSITE BIODIVERSITY IMPACTS**

---

*The project proponents must evaluate and mitigate likely negative impacts on biodiversity outside the project zone resulting from project activities.*

B2.1 Identify potential negative offsite biodiversity impacts that the project is likely to cause.

As the project areas were previously under private ownership, no activities that were occurring within the project areas have been transferred offsite.

Therefore the project proponents do not predict any negative offsite biodiversity impacts.

B2.2 Document how the project plans to mitigate these negative offsite biodiversity impacts.

The project proponents do not anticipate any offsite biodiversity impacts that require mitigation.

B2.3 Evaluate likely unmitigated negative offsite biodiversity impacts against the biodiversity benefits of the project within the project boundaries. Justify and demonstrate that the net effect of the project on biodiversity is positive.

The project proponents believe that the biodiversity impacts from the proposed project activities are unilaterally positive.

The indirect benefits of the project through the creation of economic opportunity and a move away from unsustainable subsistence livelihoods, will decrease both legal and illegal activities previously contributing to the loss of biodiversity, and therefore pressure on remaining natural resources. As the average income of households surrounding the project areas increase, and education becomes more available, it is expected that this transition will have a positive effect on biodiversity within the area, enabling regeneration of previously degraded areas.

On a more regional and global scale, the project activities are aimed at providing a sustainable alternative to timber products currently sourced from natural tropical forests. Many such species, such as Mahogany, Ipe, etc. are currently under endangered status. The projects wider and more long term impacts aim at reducing the market for these products, and therefore contributing positively to regeneration of biodiversity within similar ecosystems across Latin America.

### **B3. BIODIVERSITY IMPACT MONITORING**

---

*The project proponents must have an initial monitoring plan to quantify and document the changes in biodiversity resulting from the project activities (within and outside the project boundaries). The monitoring plan must identify the types of measurements, the sampling strategy and the frequency of measurement.*

*Since developing a full biodiversity-monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being evaluated by the CCB Standards. This is acceptable if there is an explicit commitment to develop and implement a monitoring plan.*

**B3.1** Develop an initial plan for selecting biodiversity variables to be monitored, and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the projects biodiversity

objectives and to anticipated impacts (positive and negative).

EcoPlanet Bamboo Central America, through an Environmental Impact Assessment, is aware of biodiversity components apparent on each farm. Through sampling in different conservation areas and plantation areas, we will use the appropriate methods listed in the table below to measure positive or negative impacts our operations are creating. This will be measured on a frequency suggested from the EIA consultants.

**Table 15 Biodiversity Variables to be monitored**

<b>Component</b>	<b>Sampling</b>	<b>Frequency</b>	<b>Method</b>
Birds	Area of closed forest Riparian forest area Area of bamboo plantations	Annual During the migration of birds	Visual observation with binoculars. Periodic monitoring either on foot or by vehicle.
Rodent Mammals	Area of closed forest Riparian forest area Area of bamboo plantations	In the 2 seasons of summer and winter with a deadline of 15 days each.  By stage of project management in the phases of Nursing, Planting, and harvesting in the storage area of harvested products among others.	Establishment of permanent plots for monitoring. Catches with Sherman traps in different types of coverage. Sampler unit one ha per grid of monitoring. Being able to establish 5% of monitoring of the total area being distributed in 50 ha. 25 ha. In planting and 25 ha. in Riparian forest.
Growth monitoring of Forest and Plantation	Area of closed forest Riparian forest area Area of bamboo plantations	One a year Forests. Bamboo plantations twice a year by season.	Establish permanent plots for monitoring 20*50 meters, distributing such plots in a representative manner to assess the 5% of the total area of the estate.
Surface water superficial	Points closed to Siquia River Project activities and Calderón.	Annual maintenance	Standard methods 2000. Physical and chemical parameters, biological and bacteriological (zooplankton and fito plankton) and pesticides.
Systems of treatment for liquid effluent	Evaluate components of the treatment system in operation.	Twice a year.	Verify there are no leaks, and disposal of non-reusable effluent are treated and disposed in areas of safety for the

			surface and ground waters.
Maintenance Plan for Planting	Perimeter areas of the Project	Daily monitoring in summer Annual Maintenance	Horse riding surveillance whit scheduled paths.
Plan of Social Monitoring	See Table #13 in the text.	Daily supervision in summer Annual Maintenance	Surveillance on horseback, with scheduled tours.

### **ENVIRONMENTAL MONITORING PLAN**

The environmental management plans to be implemented for the different phases of the Project will contribute to three objectives complementing each other:

1. Check for the changes in parameters in the baseline.
2. Detect whether these changes have occurred from causes related to the installation and operation of project;
3. Evaluate the effectiveness of mitigation measures applied.

To efficiently implement the plan, Rio Siquia and Rio Kama Projects will make the farm director or general supervisor fully responsible for monitoring day-to-day parameters (permanent) as well as the monitoring of other initiatives that are checked at designated times. His/her role will be coordinate all specific activities, as well as supervision, implementation of appropriate mitigation measures, monitoring and Project monitoring and maintaining a close relationship on environmental issues with MARENA and the municipality of El Rama city.

This employee will begin his/her duties since the start of the construction phase and within his/her job duties are listed as follows:

- Prepare progress reports on compliance with the environmental management plan, to provide any information about the project's environmental management and supply it to MARENA and the municipality when these institutions require it.
- Inform and train staff on environmental actions to be developed.
- Implement the environmental mitigation measures.

- Enforcement, develop and / or update contingency plans and environmental rules and regulations of the Project itself.
- Identify responsibilities regarding the implementation, operation, monitoring and control of mitigation measures.
- Set the spread of environmental activities to staff and the community concerned.

The Project component is obliged to develop all the environmental measures proposed in this environmental impact study and designated by MARENA in environmental permits. Likewise, established in the contracts with and the contractor, the mandatory clauses stipulating respect and strictly adhere to the laws and regulations regarding environmental protection, safety of works and prevention of risks, in order to produce the least possible impact on the surrounding population and the biotic and abiotic factors during the development of the work.

Below, there is a detailed description of the different activities to be implemented, under the monitoring framework and environmental control of the project.

**Table 16 Activities in the project environmental monitoring plan**

Environmental Aspects	Activities to be carried out under the monitoring and control	Area of Execution			Responsibility
		Nursery	Planting and maintenance	Harvest	
Management of solid and liquid waste.	Check the appropriate storage of oils and lubricants	Permanent	Permanent	Permanent	General supervisor
	Monitor the proper handling of domestic waste	Permanent	Permanent	Permanent	
Water management	Ensure sustainable resource use.	Permanent	Permanent	Permanent	Farm Director
	Ensure proper management of rainwaters.	Permanent	Permanent	Permanent	

Contingency plans	Monitoring and controlling the correct implementation of the following plans: Fire plan, training of staff against contingencies, and the development of simulations. Implement the contingency plan. Oversee the development of training plan aimed at workers with regards to occupational safety measures.	Monthly on dry season  Semester and when appropriate	Monthly on dry season  Semester and when appropriate	Monthly on dry season  Semester and when appropriate	Farm Director
Operation and maintenance of infrastructure	Monitor the condition and maintenance of fuel storage tank.	Permanent	Permanent	Permanent	Environmental supervisor
Environmental information management	Document all activity on environmental management in the project. Prepare reports related to environmental activity and notify MARENA.	Permanent  Permanent	Permanent  Permanent	Permanent  Permanent	Farm Director

EcoPlanet Bamboo is committed to carrying out a biodiversity re-assessment every 5 years after the original biodiversity baseline. This monitoring is aimed at providing quantitative scientific data on the contribution of integrated bamboo plantations for the regeneration of biodiversity in previously degraded areas. An outside consultant, such as the EIA consultants used in our original assessment, will do this.

### Environmental Impact Indicators

In order to verify the impact of the projects, EcoPlanet Bamboo has identified the following environmental indicators to be monitored and reported on.

**Table 17 Environmental impact monitoring indicators**

Variable	Indicator	Means of Verification
Decline of illegal activities	Signs posted in conjunction with protecting the environment	Signs monitored monthly to ensure they are still intact.
	# of hectares lost to illegal logging	GIS maps indicating the conservation zones are updated every 3 years and will show any loss to illegal logging

	# of incidences of reported illegal activities	Incidences reported and monitored with reports available at the company's office
<b>Carbon Credits</b>	Tons of CO2 sequestered	CO2 calculations provided by VCS PD and associated monitoring
<b>Safe and Organic Practices</b>	# of non-organic fertilizers used at the project	As stated in the management plan, which is updated annually.
	% of staff trained in proper handling of chemicals in relations to staff who handle chemicals	Attendance list of employees trained compared to management list of employees who handle chemicals
<b>Protection of rare and endangered species</b>	Management Plan integrates a plan for High Value Conservation Forests	Section in the management plan dedicated to High Value Conservation Forest conservation areas.
	Signs posted in conjunction with protecting the environment	Signs monitored monthly to ensure they are still intact.
	Biodiversity Assessment including # of birds, mammals, herpetofauna, as well as flora	Biodiversity Assessment is conducted every 5 years and compared against the biodiversity baseline assessment
<b>Reforestation</b>	Total area reforested by plantation (ha)	As indicated by numbers of ha planted with bamboo in the operational plan.
	Total Number of bamboo clumps planted	As indicated by numbers of ha planted with bamboo in the operational plan.
<b>Preservation of conservation zones and areas.</b>	Identification and preservation of conservation zones and areas.	GIS maps indicating the conservation zones are updated every 3 years to show conservation zones are intact.
	Area of forest conserved (ha)	GIS data available at the company office indicating size of forest conserved
	Total number of ha of low-intensity enrichment planting	Data to be collected and managed by the plantation managers once this activity begins.
	100% compliance with Protection Zones	GIS data available at the company office & management plan outlines protected zones
<b>Environmental Empowerment</b>	# of people impacted by sustainable livelihood projects financed with carbon finance	Interviews, surveys, assessments to be conducted once carbon finance is paid out.
	# of people adopting an alternative livelihood activity	Interviews, surveys, assessments
	% of local population changing from negative to positive attitude to forest conservation measures	Interviews, surveys, assessments
<b>Knowledge of International Treaties</b>	Degree of knowledge of international treaties by the staff	Interviews, surveys, assessments
	100% of international treaties that relate to the project are present in the company for consultation	Documents on file at the company office

<b>Land Tenure</b>	Possession of Clear and Legal Land title	The land title is on file at the company office
--------------------	--	---

B3.2 Develop an initial plan for assessing the effectiveness of measures used to maintain or enhance HCVs related to globally, regionally or nationally significant biodiversity (G1.8) present in the project zone.

Environmental assessment of the HCV sites on our bamboo plantation will be based on the assumption that the negative effect will be offset through mitigation measures mentioned in G3.8. While environmental assessments will be carried out through period of five years, this plan below is to establish a baseline of current status of the site that can fulfill the following objectives:

- A comparative analysis of environmental involvement of an ecosystem with and without environmental intervention has been measured through information provided by the EIA study.
- Assessments are both quantitative and qualitative; the latter shall be used only in cases that cannot be quantitatively projecting the negative effects.

To achieve both objectives we have developed the following methodological steps:

1. Identify the activities or actions that adversely impact on the environment.
2. Analyze and predict how these actions can alter the various environmental components (physical and social), based on past experiences and professional opinion.
3. Assess the extent and intensity of each effect identified.

The project zone is defined in section G1.3.

B3.3 Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring they are made publicly available on the internet and are communicated to communities and other stakeholders.

EcoPlanet Bamboo is committed to providing annual reports to its shareholders and investors on its triple bottom line objectives. This includes an assessment of positive biodiversity and environmental impacts that are monitored against the factors as defined within the biodiversity baseline. These results will be made available on the company websites, and within annual reports.

---

---

## **GL. GOLD LEVEL SECTION.....**

---

---

### **GL1. CLIMATE CHANGE ADAPTATION BENEFITS**

---

*This identifies projects that will provide significant support to assist communities and/or biodiversity in adapting to the impacts of climate change. Anticipated local climate change and climate variability within the project zone could potentially affect communities and biodiversity during the life of the project and beyond. Communities and biodiversity in some areas of the world will be more vulnerable to the negative impacts of these changes due to: vulnerability of crops of production systems to climatic changes; lack of diversity of livelihood resources and inadequate resources, institutions and capacity to develop new livelihood strategies; and high levels of threat to species survival from habitat fragmentation.*

*Land based carbon projects have the potential to help local communities and biodiversity adapt to climate change by: diversifying revenues and livelihood strategies; maintaining valuable ecosystem services such as hydrological regulation, pollination, pest control and soil fertility; and increasing habitat connectivity across a range of habitat and climate types.*

GL1.1 Identify likely regional climate change and climate variability scenarios and impacts using available studies, and identify potential changes in the local land-use scenario due to these climate change scenarios in the absence of the project.

The United Nation’s Development Program (UNDP) and its associated country programming office for Nicaragua, states that:

*“Climate change, both its risks and opportunity implications, is highly important to Nicaragua due to the social, economic and environmental (or natural) conditions of country as well as its geographic position, all of which make the country highly vulnerable to the impacts of climate change.”*

Many studies have been carried out by the United Nations, World Bank and the FAO, highlighting the projected changes in climate change as associated impacts under different scenarios.

The general risks associated with the projected impacts of regional climate change for Nicaragua include:

- Anomalies in precipitation patterns
- Increase of sea level resulting in coastal flooding and associated health risks
- Increased intensity and frequency of extreme events
- Decrease agricultural productivity
- Insecurity in water resources
- The collapse of ecosystems

**Table 18 UNDP expected climate change impacts in Nicaragua**

Health	<ul style="list-style-type: none"> <li>• An increase in temperature would cause an increase in cases of malaria and other diseases.</li> <li>• Alteration of the territorial patterns and epidemiologic behavior of hydric, vectorial, allergic and</li> <li>• respiratory diseases.</li> <li>• Greater expenses in the public health sector and in services to the most vulnerable population</li> <li>• (children and senior citizens) due to an increase in viral and bacterial diseases.</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Recurrent droughts, heat waves and extension of summers would result in a decrease of agricultural production and the loss of crops within the Pacific and Central regions.</li> <li>• Severe impacts in areas that are currently suitable and safe for the production of basic grains.</li> <li>• Severe falls in the productivity of the Chinandega, León, Managua and Masaya departments, which could create greater social conflicts since these departments are home to more than 65% of the rural population.</li> <li>• Scarcity of food in the cities; loss of crops in the country; drop in the national food security.</li> <li>• Greater displacement of population from the countryside to the city, due to the lack of economic</li> <li>• opportunities in the agricultural and fishing sectors.</li> </ul>
Water Resources	<ul style="list-style-type: none"> <li>• An increase in conflicts due to the use and distribution of water resources.</li> <li>• A decrease in drinking water availability in urban centers.</li> <li>• Sustained reduction of water recharges due to an unsustainable use of freshwater resources.</li> <li>• Diminished aquifer levels of up to 2 m and a decrease in the flow rate caused by recurrent droughts and the overuse and contamination of underground water sources.</li> <li>• Increased competition for water resources, especially during drought seasons, which would seriously affect the productivity of hydroelectric plants.</li> </ul>

Coastal Systems	<ul style="list-style-type: none"> <li>• Loss in the fishery sector due to floods, coastal sinking and sedimentation (i.e., scarcity of products such as shrimp and fish, decrease in productivity and exports).</li> <li>• Threats to ecosystems such as wetlands (RAMSAR sites), mangroves, coastal lagoons and coral reefs due to coastal erosion.</li> <li>• Socio-economic losses for coastal populations due to floods, sea level increase and coastal erosion (leading to displacement of populations settled within the Pacific and Caribbean Coasts).</li> <li>• An increase in the vulnerability of the tourism sector—the second most important income-generating sector—and real estate in coastal zones due to erosion, coastal sedimentation and greater frequency of extreme events.</li> <li>• An increase in the vulnerability to extreme events and a decrease in income from tourism activities for indigenous and African descent communities in the Atlantic, who promote and rely on community tourism for income generation.</li> </ul>
Ecosystems	<ul style="list-style-type: none"> <li>• Disappearance of very humid sub-tropical and pre-mountainous sub-tropical forest areas, which</li> <li>• would affect the species of flora and fauna that depend on these ecosystems.</li> </ul>
Settlements	<ul style="list-style-type: none"> <li>• Substantial damage to the infrastructure and to the unstable settlements in high-risk areas, due to the increased frequency of extreme events (floods, tropical storms and landslides), which would negatively affect living conditions of the vulnerable communities established in these areas.</li> <li>• Increase in permanently displaced populations.</li> <li>• Increased sensitivity and vulnerability of human settlements and land use practice due to changes in the usual supply and demand of water.</li> </ul>

Given the current levels of human development within the country, and in particular within the Atlantic states, each of these changes poses a significant threat in the fight against poverty and inequalities in the country.

Relating specifically to agriculture and forestry based activities, the World Bank's 2009 projected impacts for the Atlantic coast of Nicaragua are based on climate scenarios developed for the elaboration of the First National Communication for the next 100 years (taken from [www-wds.worldbank.org](http://www-wds.worldbank.org)):

- a) Increases in temperature – it is probable that the temperature will increase by 0.8°C in the Atlantic side by 2010, 1.9°C by 2050 and 3.3°C by 2100, according to the most pessimistic scenario.
- b) Decreases in precipitation – it is probable that the average annual precipitation will decrease from 8.2% (2010) to 35.7% (2100) on the Atlantic side, according to the most pessimistic scenario.
- c) Decreased cloud cover – it is probable that a reduction in cloudiness will occur from 4% (2010) to 17.2% (2100) on the Atlantic side according to the most pessimistic scenario.

GL1.2 Identify any risks to the project's climate, community and biodiversity benefits resulting from likely climate change and climate variability impacts and explain how these risks will be mitigated.

Risks to the project's objectives originating from climate change and climate variability impacts are limited to:

- Decreased rainfall affecting the growth of *Guadua aculeata*
- Extreme events

The average rainfall within the RAAS is currently significantly greater than the known lower limits for species within the *Guadua* genus of bamboo to thrive. Decreased rainfall patterns are only likely to have a significant negative impact on the growth of this species within the first 3yr establishment phase. To mitigate these risks, EcoPlanet Bamboo has selected project sites with access to water. Both unique project sites are bordered by a major, non-seasonal river, from which irrigation can be used in the event of periods of drought during the establishment phase.

Furthermore, the re-establishment of a forest system is predicted to better maintain water tables and precipitation patterns within the surrounding micro-climate, which, over the past years, has seen a decrease in annual rainfall associated with deforestation and land use change.

Although extreme events are a threat, the project areas have been chosen inland to minimize this risk. Furthermore, the establishment of mature forests of *Guadua aculeata* are likely to reduce the impact of extreme weather events. The clumping system of the species underground rhizome system contributes to soil stabilization, reducing the impact of erosion or heavy rainfall. The strength and flexibility of the canopy of individual culms can withstand significant pressure and wind temperatures, and are expected to not only withstand, but also temper the effects of extreme weather.

GL1.3 Demonstrate that current or anticipated climate changes are having or are likely to have an impact on the well-being of communities and/or the conservation status of biodiversity in the project zone and surrounding regions.

## **Communities**

In the without project scenario, data shows that the predicted increases in climate variation will have a negative impact on communities within the project zone, due to levels of vulnerability, poor economic standing, lack of infrastructure and poor capacity to deal with change. Information for Nicaragua shows that the poorest households and communities will be the one's most subjected to negative impacts. The RAAS, and communities surrounding the project areas represent such households.

In contrast, the proposed project scenario will mitigate such variations in climate, as well as decrease the vulnerability of these communities through economic empowerment in the project zone. The project zone is defined in section G1.3. The project has to date created employment for these communities, including marginalized groups such as women, and has significantly increased the annual income of these households – for many taking them from far below, to over the national poverty line for Nicaragua.

In addition to increasing the ability for such communities to deal with predicted climate change impact through economic empowerment, the proposed project activities lead directly to a stabilization of local climates as described in section GL1.2 above. This will reduce the impact of any changes through rising global temperatures, and have a positive impact on communities within the surrounding area by regulating precipitation and weather variability, and therefore providing a more stable climate for the continuation of pre-project land use of small scale subsistence agriculture within the surrounding areas.

## **Biodiversity**

One of the major predicted impacts of climate change for Nicaragua is the potential collapse of the ecosystem. The Atlantic States of the RAAS and the RAAN, given the devastating and rapid loss of forest cover over recent decades, combined with the topography, ecological conditions, and move towards unsustainable land use, are the most vulnerable to this.

The functioning of a tropical forest ecosystem is dependent upon the interaction of healthy and vibrant biodiversity at all levels. When a landscape becomes fragmented and marginalized, these interactions cease to exist, until a tipping point is reached. In the absence of the project activities, and in the continuation of the without project scenario, anticipated climate change impacts within this region are likely to contribute and speed up this gradual loss of biodiversity until the ecosystem collapses entirely.

In contrast, the project aims to recreate, as close as is economically feasible, a functioning forest ecosystem, of commercial *Guadua aculeata* interspersed with existing mature forest remnants, and in this way enable the reestablishment of biodiversity from soil through shrub layers through a closed forest canopy. The maintenance and regeneration of such biodiversity will mitigate any negative climate change impacts, and enable the ecosystem to adapt to such changes before it is too late.

## **GL2. EXCEPTIONAL COMMUNITY BENEFITS**

*This recognizes project approaches that are explicitly pro-poor in terms of targeting benefits to globally poorer communities and the poorer, more vulnerable households and individuals within them. In so doing, land based carbon projects can make a significant contribution to reducing poverty and enhancing the sustainable livelihoods of these groups.*

*Given that poorer people typically have less access to land and natural assets, this criterion requires innovative approaches that enable poorer households to participate effectively in land base carbon activities. Furthermore, it requires that the project will 'do no harm' to poorer and more vulnerable members of the communities, by establishing that no member of a poorer or more vulnerable social group will experience a net negative impact on their well being or rights.*

GL2.1 Demonstrate that the project zone is in a low human development country OR in an administrative area of a medium/high development country in which at least 50% of the population of the area is below the national poverty line.

The foundation website for the Development of the Atlantic Coast of Nicaragua ([www.fadcanic.or.ni](http://www.fadcanic.or.ni)) mentions that the rate of illiteracy among the population 10 years or older is 43 percent. Illiteracy is more widespread in the rural areas, where this percentage rises to 55 percent, with an even higher rate among the female population. The rate of illiteracy for the country as a whole is 24.5 percent. Meanwhile, three fourths (73.6 to 75% ) of the population of the Nicaraguan Caribbean Coast lives in situations of poverty and extreme poverty. The employed workforce earns very low wages that merely cover half the cost of the basic consumer basket. As much as 80 percent of an average salary on the Coast is destined to the purchase of food items. The project zone, as defined in section G1.3, is therefore located in a low development region.

GL2.2 Demonstrate that at least 50% of the households within the lowest category of well-being (poorest quartile) of the community are likely to benefit substantially from the project.

The project proponents are focused on maximizing local potential and involvement to the extent possible given the regions' remoteness and small local population. EcoPlanet Bamboo wants to invest not only in plantations, but also in the local communities, generating stable employment and upward mobility to assure a stable base of social capital.

By diversifying skillsets and giving local community members opportunities to try different positions in relation to the project, it is the goal of the project to encourage full participation amongst local communities, and to allow them to identify their own strengths and interests.

The company will preferentially recruit from the local communities when and if possible, giving further preference to those willing to work and in evident financial need.

GL2.3 Demonstrate that any barriers or risks that might prevent benefits going to poorer households have been identified and addressed in order to increase the probable flow of benefits to poorer households.

The company will preferentially hire local residents from the municipalities close to the sites for all wage labour positions. Higher order positions will need to be filled by qualified individuals, with preference going to be given to locals and Nicaraguan nationals. Individual interviews are carried out for any applications, and EcoPlanet Bamboo does not hire based off gender, religion nor political inclination.

During the planting season, temporary labourers may be employed to fulfil high work demand. These employees will be hired preferentially from the local community on short-term contracts. These employees will have access to training and capacity building workshops, with the hope that these 'casual labourers' may become a valuable resource.

Within the project areas, the workplace optimizes social impact and worker wellbeing by providing necessary facilities for a safe work environment. 34 pit latrines, of which 17 are for men and 17 for women, have been installed and are spread throughout the project areas. Additionally, drinking water is available in the project areas for all employees, as well as resting places with benches in the shade within both nurseries. The wastewater treatment systems for kitchens and nursing stations utilize a

natural method of filtration using stones and charcoal.

Furthermore, the project areas each have a full-time qualified nurse who ensures the health and safety of the employees. The nurses work closely with the local hospital, Blue Cross of Juigalpa, ensuring that employee health and well being comes first. All employees hired by the project are required to undergo health examinations as well as an annual examination, which ensures employees are placed in positions that will not and are not having adverse effects on their health. The check-ups also ensure that health problems are detected early so they can be treated effectively. Employees are allowed to visit the nurses anytime they are in need of medical assistance.

GL2.4 Demonstrate that measures have been taken to identify any poorer and more vulnerable households and individuals whose well-being or poverty may be negatively affected by the project, and that the project design includes measures to avoid any such impacts. Where negative impacts are unavoidable, demonstrate that they will be effectively mitigated.

A survey was given asking the local stakeholders if they foresee any problems caused by the project and over 90% of respondents replied that the project would not cause inconvenience to the community. Less than 10% of the people who mentioned it could cause problems for the community, presented the following:

1. Air pollution from production of smoke and possible breathing problem of people who live in the vicinity of the area
2. Soil contamination and surface water contamination by the use of agrochemicals.

Soil contamination and surface water contamination will be prevented through the proper procedures of chemical application, which have already been implemented, and all employees applying chemicals and fertilizers have been trained and are well aware of the rules. Smoke will not be produced in any operations conducted by EcoPlanet Bamboo

GL2.5 Demonstrate that community impact monitoring will be able to identify positive and negative impacts on poorer and more vulnerable groups. The social impact monitoring must take a differentiated approach that can identify positive and negative impacts on poorer households and individuals and other disadvantage groups, including women.

We provide equal opportunities for all individuals in the community we have our bamboo operations in. Please refer to Table 13 in CM 3.1 displaying our monitoring plan to view the systems our company has in place to identify positive and negative impacts.

### GL3. EXCEPTIONAL BIODIVERSITY IMPACTS

*This criterion identifies projects that conserve biodiversity at sites of global significance for biodiversity conservation. Sites meeting this must be based on the Key Biodiversity Area (KBA) framework of vulnerability and irreplaceability. These criteria are defined in terms of species and population threat levels. These scientifically based criteria are drawn from existing best practices that have been used, to date, to identify important sites for biodiversity in over 173 countries*

GL3.1 Demonstrate that the project zone includes a site of high biodiversity conservation priority by meeting either the vulnerability or irreplaceability criteria defined below:

1. Vulnerability: Regular occurrence of a globally threatened species (according to the IUCN Red List) at the site:

1.1 Critically endangered (CR) and Endangered (EN) species – presence; or

1.2 Vulnerable species (VU) – presence of at least 30 individuals or 10 pairs

OR

2. Irreplaceability: A minimum proportion of a species global population present at the site at any stage of the species lifecycle according to the following thresholds”

2.1 Restricted-range species – species with a global range of less than 50,000km<sup>2</sup> and 5% of global population at the site; or

2.2 Species with large but clumped distributions – 5% of the global population at the site; or

2.3 Globally significant congregations – 1% of the global population seasonally at the site; or

2.4 Globally significant source populations – 1% of the global population at the site.

Under the Proforest’s HCVF Toolkit definition, the project zone and unique project areas do not contain any HCVs. However under the given CCBA definition of a HCV, the project areas do contain such HCVs having the endangered species identified below.

Rio Siquia has 1 species of Least Concerned (LC), which is the *Caluromys Derbyanus* (Central American Wholly Opossum), and 1 Critically Endangered Species (CR) which is the *Ptychohyala hypomykter* (No common name/amphibian). Rio Kama has no endangered animal species at this time but tree species found on the farm such as chaperno (*Lonchocarpus yoroensis*) is in the category of critically endangered (CR), while the Lizard Tree (*Zanthoxylum belizense*) and Bimbayan (*Vitex gaumeri*), are listed as

endangered (EN) under the IUCN.

In addition to the above mentioned species, CITES lists a number of species, which can be found within the project zone. For Rio Siquia, *Caiman crocodilus* (common caiman) and *Iguana iguana* (Green Iguana) are listed under protection level II and *Boa constrictor* (Boa Constrictor) is listed under protection level I. The following bird species are listed under II protection level: *Brotogeris jugularis* (Orange Chinned Parakeet) and *Aratinga Nana* (Olive throated Parakeet).

At Rio Kama, the following bird species are listed under protection level II: *Buteo magnirostris* (roadside hawk), *Elanus leucurus* (white-tailed kite), *Buteo brachyurus* (short-tailed hawk), *Micrastur semitorquatus* (collared forests falcon), *Brotogeris jugularis* (Orange Chinned Parakeet), *Aratinga Nana* (Olive throated Parakeet), and *Amazilia tzacatl* (rufous-tailed hummingbird). There is one mammal species protected under CITES, which is *Alouatta palliata* (mantled howler monkey) under protection level I. Lastely, the *Iguana iguana* (green iguana) is an amphibian listed under protection level II. Rio Kama and Rio Siquia are located in the project zone as defined in section G1.3 of the CCBA document.

# ANNEX A BIODIVERSITY RESULTS

## RIO SIQUIA

### Birds

Nº	Birds			Technique			Status	Protection Level		
	Family	Scientific Name	Common Name	OD	R	E		CITES	SNV	UICN
1	CATHARTIDAE	<i>Coragyps atratus</i>	Black Vulture	*		*	R			
2	ACCIPITRIDAE	<i>Buteo magnirostris</i>	Roadside Hawk	*		*	R		VNI	
3	COLUMBIDAE	<i>Patagioenas speciosa</i>	Scaled Pigeon	*		*	R			
4	COLUMBIDAE	<i>Columbina talpacoti</i>	Ruddy Ground Dove	*		*	R			
5	PSITTACIDAE	<i>Aratinga finshi</i>	Crimson Fronted Parakeet	*		*	R	ApII	VNI	
6	PSITTACIDAE	<i>Brotogeris jugularis</i>	Orange Chinned Parakeet	*		*	R	ApII	VNI	
7	PSITTACIDAE	<i>Aratinga nana</i>	Olive-throated Parakeet	*		*	R	ApII	VNI	
8	CUCULIDAE	<i>Piaya cayana</i>	Squirrel Cuckoo	*		*	R			
9	CUCULIDAE	<i>Crotophaga ani</i>	Smooth-billed Ani	*		*	R			
10	TROCHILIDAE	<i>Microchera albocoronata</i>	Snowcap	*			R			
11	PICIDAE	<i>Melanerpes formicivorus</i>	Acorn Woodpecker	*		*	R			
12	PICIDAE	<i>Melanerpes hoffmannii</i>	Hoffmann's Woodpecker	*		*	R			
13	PICIDAE	<i>Dryocopus lineatus</i>	Lineated Woodpecker	*		*	R			
14	FURNARIDAE	<i>Dendrocincla homochroa</i>	Ruddy Woodcreeper	*			R			
15	TYTIRIDAE	<i>Tityra semifasciata</i>	Masked Tityra	*			R			
16	TYRANIDAE	<i>Tyrannus savana</i>	Fork-tailed Flycatcher	*		*	R			
17		<i>Pitangus sulfuratus</i>	Great Kiskadee	*		*	R			
18		<i>Conopias albobittata</i>	White ringed Flycatcher	*		*	R			
19		<i>Myarchus tyrannulus</i>	Brown-crested Flycatcher	*		*	R			
20		<i>Myarchus nuttingi</i>	Nutting's Flycatcher	*			R			
21	TROGLODYTIDAE	<i>Thryothorus thoracicus</i>	Stripe-breasted Wren	*			R			
22	CORVIDAE	<i>Cyanocorax morio</i>	Brown Jay	*		*	R			
23	TURDIDAE	<i>Turdus grayi</i>	Clay-colored Robin	*			R			
24	ICTERIDAE	<i>Psaracolius montezuma</i>	Montezuma Oropendola	*		*	R			
25		<i>Quiscalus mexicanus</i>	Great-tailed Grackle	*		*	R			
26		<i>Sturnella magna</i>	Eastern Meadowlark	*			R			
27	THRAUPIDAE	<i>Thraupis episcopus</i>	Blue-gray Tanager	*			R			
28		<i>Tangara larvata</i>	Golden-hooded Tanager	*			R			
29		<i>Ramphocelus passerinii</i>	Passerini's Tanager	*			R			
30	EMBEREZIDAE	<i>Volantinia jacarina</i>	Blue-black Grassquit	*			R			
31		<i>Oryzoborus funereus</i>	Thick-billed Seed-Finch	*			R			

OD: Direct observation; R: traces and signs ; E: Interview key residents; Status: resident or migratory Birds; CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora and Appendix I, II, III; SNV: National Wildlife Protection System, VNI: Indefinite closure and VPNI: Partial closure ; UICN: International Union for Conservation of Nature

## Mammals

Mammals				Technique			Protection Level		
Nº	Family	Scientific Name	Common Name	OD	R	E	CITES	SNV	UICN
	<b>MAMMALIA</b>								
1	DIDELPHIDAE	<i>Didelphis virginiana</i>	Virginia Opossum			*			
2		<i>Caluromys derbianus</i>	Central American Woolly Opossum			*			VU
3		<i>Marmosa mexicana</i>	Mexican Mouse Opossum			*			
4	DASYPODIDAE	<i>Dasyopus novemcinctus</i>	Nine-banded Armadillo	*	*	*		VPN	
5	BRADYPODIDAE	<i>Bradypus variegatus</i>	Brown-throated Three-toed Sloth	*		*		VNI	
6	MYRMECOPHAGIDAE	<i>Tamandua mexicana</i>	Northern Tamandua	*		*		VNI	
7	CEBIDAE	<i>Alluatta palliata</i>	Mantled Howler Monkey	*		*		VNI	
8	MUSTELIDAE	<i>Eira barbara</i>	Tayra			*		VNI	
9		<i>Lutra longicauda</i>	Neotropical River Otter			*		VNI	
10		<i>Conepatus semistriatus</i>	Striped Hog-nosed Skunk			*			
11	SCIURIDAE	<i>Sciurus variegatoides</i>	Variiegated Squirrel	*		*			
12	PROCYONIDAE	<i>Procyon lotor</i>	Northern Raccoon			*			
13	AGOUTIDAE	<i>Agouti paca</i>	Paca			*		VPN	
14	DASYPROCTIDAE	<i>Dasyprocta punctata</i>	Central America Agouti			*		VPN	
15	LEPORIDAE	<i>Silvilagus floridanus</i>	Eastern Cottontail			*			

OD: Direct observation; R: traces and signs ; E: Interview key residents; CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora and Appendix I, II, III; SNV: National Wildlife Protection System, VNI: Indefinite closure and VPN: Partial closure ; UICN: International Union for Conservation of Nature

## Amphibians

Herpetofauna				Techniques			Protection Level		
Nº	Family	Scientific Name	Common Name	OD	R	E	CITES	SNV	UICN
	<b>AMPHIBIA</b>								
1	CAECILIDAE	<i>Gymnophis multiplicata</i>				*			
	ANURA								
2	BUFONIDAE	<i>Bufo marinus</i>	Marine toads			*			
3		<i>Bufo haematiticus</i>				*			
4	CENTROLENIDAE	<i>Centrolene ilex</i>	Ghats Glass Frog			*			
5	LEPTODACTYLIDAE	<i>Leptodactylus pentadactylus</i>	Central American Bullfrog			*			
6	HYLIDAE	<i>Agalychnis callidryas</i>	Red - eyed Tree Frog			*		VPN	
7		<i>Hyla microcephala</i>	Yellow Treefrog			*			
8		<i>Hyla phlebodes</i>	San Carlos Treefrog			*			
9		<i>Hyla rufitela</i>				*			
10		<i>Ptychohyla hypomyker</i>				*			CR
11		<i>Smilisca baudini</i>	Mexican treefrog			*			
12		<i>Smilisca pheota</i>				*			
13		<i>Scinax staufferi</i>				*			
14		<i>Scinax elaeochroa</i>				*			
15	RANIDAE	<i>Rana vaillanti</i>	Vaillant's frog			*			
	<b>REPTILIA</b>								
16	ALLIGATORIDAE	<i>Caimán crocodilus</i>	Common caiman			*	II	VPN	
17	EMYDIDAE	<i>Trachemys scripta</i>	Pond Slider			*			
18	GEKKONIDAE	<i>Gonotodes albogularis</i>	Yellow-headed Gecko	*		*			
19		<i>Sphaerodactylus millepunctatus</i>	Spotted Least Gecko			*			
20		<i>Lepidophima flavimaculatum</i>				*			
21	IGUANIDAE	<i>Basiliscus plumifrons</i>	Green Basiisk	*		*		VPN	
22		<i>Basiliscus vittatus</i>	Brown Basilisk	*		*		VPN	
23		<i>Iguana iguana</i>	Green Iguana	*		*	II	VPN	
24		<i>Norops sericeus</i>	Silky Anole			*			
25		<i>Norops lionotus</i>	Lion Anole			*			
26		<i>Norops humilis</i>	Humble Anole			*			
27		<i>Norops lemuringus</i>	Ghost Anole			*			
28		<i>Norops limifrons</i>	Border Anole			*			
29		<i>Corytophanes cristatus</i>	Smooth Helmeted Iguana			*			
30	SCINDIDAE	<i>mabuya unimarginata</i>	Central American Mabuya			*			
31	TEIIDAE	<i>Aspidoscelis deppii</i>	Blackbelly Racerunner	*		*			
32		<i>Ameiva festiva</i>	MiddleAmerican Ameiva			*			
33	BOIDAE	<i>Boa constrictor</i>	Boa Constrictor			*	II	VPN	
34	COLUBRIDAE	<i>Dryadophis dorsalis</i>	Sabanerita, Lagartijera Montana			*			
35		<i>Drymobius margariferus</i>	Speckled Racer			*			
36		<i>Drymobius melanotropis</i>	Black Forest Racer			*			
37		<i>Eritrolamphrus mimus</i>	Mimic False Coral Snake			*			
38		<i>Elaphe flavirufa</i>				*			
39		<i>Drymarchon corais</i>	Indigo Snake			*			
40		<i>Sibon nebulatus</i>	Cloudy Snail-eating Snake			*			
41		<i>Oxyrhopus petola</i>	Forest Flame Snake			*			
42		<i>Pliocercus euryzonus</i>	Cope's False Coral Snake			*			
43		<i>Ninia Sebae</i>	Redback Coffee Snake			*			
44		<i>Ninia maculata</i>	Spotted Coffee Snake			*			
45		<i>Spillotes pullatus</i>	Yellow Rat Snake			*			
46		<i>Chironius grandisquamis</i>	Ecuador Sipo			*			
47		VIPERIDAE	<i>Bothrops asper</i>	Terciopelo			*	III	
48	ELAPIDAE	<i>Micrurus nigrocinctus</i>	Central American Coral Snake			*	III		
49		<i>Micrurus alleni</i>	Allen's Coral Snake			*			

OD: Direct observation; R: traces and signs ; E: Interview key residents; CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora and Appendix I,II,III; SNV: National Wildlife Protection System, VNI: Indefinite closure and VPN: Partial closure ; UICN: International Union for Conservation of Nature

# RIO KAMA

## Birds

Nº	Birds			Technique			Status	Protection Level		
	Family	Scientific Name	Common Name	OD	R	E		CITES	SNV	UICN
1	CATHARTIDAE	<i>Coragyps atratus</i>	Black Vulture	*		*	R			
2	ACCIPITRIDAE	<i>Buteo magnirostris</i>	Roadside Hawk	*		*	R	II	VNI	
3	ACCIPITRIDAE	<i>Elanus leucurus</i>	White-Tailed Kite	*			R	II	VNI	
4	ACCIPITRIDAE	<i>Buteo brachyurus</i>	Short-Tailed Hawk	*			R	II	VNI	
5	FALCONIDAE	<i>Micrastor semitorquatus</i>	Collared Forests Falcon	*			R	II	VNI	
6	COLUMBIDAE	<i>Claravis pretiosa</i>	Blue Ground Dove	*		*	R			
7	COLUMBIDAE	<i>Patagioenas nigrirostris</i>	Short Pilled Pigeon	*			R			
8	COLUMBIDAE	<i>Columbina talpacoti</i>	Ruddy Ground Dove	*		*	R			
9	PSITTACIDAE	<i>Aratinga finshi</i>	Crimson Fronted Parakeet	*		*	R	II	VNI	
10	PSITTACIDAE	<i>Brotogeris jugularis</i>	Orange Chinned Parakeet	*		*	R	II	VNI	
11	PSITTACIDAE	<i>Aratinga nana</i>	Olive-throated Parakeet	*		*	R	II	VNI	
12	PSITTACIDAE	<i>Amazona autumnalis</i>	Red-lore Parrot	*		*	R	II		
13	CUCULIDAE	<i>Crotophaga ani</i>	Smooth-billed Ani	*		*	R			
14	TROCHILIDAE	<i>Amazilia rutila</i>	Cinnamon Hummingbird	*			R			
15	TROCHILIDAE	<i>Amazilia tzacatl</i>	Rufous-tailed Hummingbird	*			R	II		
16	PICIDAE	<i>Melanerpes formicivorus</i>	Acorn Woodpecker	*		*	R			
17	ARDEIDAE	<i>Butorides virescens</i>	Green Heron	*		*	R			
18	JACANIDAE	<i>Jacana spinosa</i>	Northern Jacana	*		*	R			
19	FURNARIDAE	<i>Dendrocincla homochroa</i>	Ruddy Woodcreeper	*			R			
20	TYRANINIDAE	<i>Pitangus sulfuratus</i>	Great Kiskadee	*		*	R			
21	TYRANINIDAE	<i>Conopias albivittata</i>	White ringed Flycatcher	*		*	R			
22	TYRANINIDAE	<i>Myiarchus tyrannulus</i>	Brown-crested Flycatcher	*		*	R			
23	TYRANINIDAE	<i>Myiarchus nuttingi</i>	Nutting's Flycatcher	*			R			
24	TROGLODYTIDAE	<i>Troglodytes aedon</i>	House Wren	*			R			
25	CORVIDAE	<i>Cyanocorax morio</i>	Brown Jay	*		*	R			
26	TURDIDAE	<i>Turdus grayi</i>	Clay-colored Robin	*			R			VPN
27	ICTERIDAE	<i>Psarocolius monctezuma</i>	Montezuma Oropendola	*		*	R			
28	ICTERIDAE	<i>Quiscalus mexicanus</i>	Great-tailed Grackle	*		*	R			
29	ICTERIDAE	<i>Sturnella magna</i>	Eastern Meadowlark	*			R			
30	THRAUPIDAE	<i>Thraupis episcopus</i>	Blue-gray Tanager	*			R			
31	THRAUPIDAE	<i>Tangara larvata</i>	Golden-hooded Tanager	*			R			
32	THRAUPIDAE	<i>Ramphocelus passerinii</i>	Passerini's Tanager	*			R			
33	EMBEREZIDAE	<i>Oryzoborus funereus</i>	Thick-billed Seed-Finch	*			R			
34	ARDEIDAE	<i>Bubulcus ibis</i>	Cattle Egret	*		*	R			
35	ARDEIDAE	<i>Ardea Alba</i>	Great Egret	*		*	R			
36	CRACIDAE	<i>Ortalis cinereiceps</i>	Gray-headed Chachalaca			*	R			VPN
37	STRINGIDAE	<i>Bubo virginianus</i>	Great Horned Owl			*	R			
38	CAPRIMULGIDAE	<i>Caprimulgus rufus</i>	Rufous Nightjar			*	R			
39	TROCHILIDAE	<i>Phaethon rubricauda</i>	Scaly-breasted Hummingbird			*	R			
40	RAMPHASTIDAE	<i>Selenidera spectabilis</i>	Yellow-eared Toucanet			*	R	II	VNI	
41	PICIDAE	<i>Veniliornis fumigatus</i>	Smoky-brown Woodpecker			*	R			
42	PICIDAE	<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker			*	M			
43	FURNARIDAE	<i>Dendrocincla fuliginosa</i>	Plain-brown Woodcreeper			*	R			
44	EMBEREZIDAE	<i>Amaurospiza concolor</i>	Blue Seedeater			*	R			

OD: Direct observation; R: traces and signs ; E: Interview key residents; CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora and Appendix I,II,III; SNV: National Wildlife Protection System, VNI: Indefinite closure and VPN: Partial closure ; UICN: International Union for Conservation of Nature

## Mammals

Mammals				Technique			Protetion Level		
Nº	Family	Scientific Name	Common Name	OD	R	E	CITES	SNV	UICN
1	DASYPODIDAE	<i>Dasypus novemcinctus</i>	Nine-banded Armadillo		*	*		VPN	
2	MYRMECOPHAGIDAE	<i>Tamandua mexicana</i>	Northern Tamandua		*	*	III	VNI	
3	CEBIDAE	<i>Alluatta palliata</i>	Mantled Howler Monkey	*		*	I	VNI	
4	SCIURIDAE	<i>Sciurus variegatoides</i>	Variegated Squirrel	*		*			
5	PROCYONIDAE	<i>Procyon lotor</i>	Northern Raccoon			*			

OD: Direct observation; R: traces and signs ; E: Interview key residents; CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora and Appendix I,II,III; SNV: National Wildlife Protection System, VNI: Indefinite closure and VPN: Partial closure ; UICN: International Union for Conservation of Nature

## Amphibians

Herpetofauna				Techniques			Protection Level		
Nº	Family	Scientific Name	Common Name	OD	R	E	CITES	SNV	UICN
1	BUFONIDAE	<i>Bufo marinus</i>	Marine toads	*		*			
2	LEPTODACTILIDAE	<i>Physalaemus pustulosus</i>	Tungara frog	*					
3	REPTILIA								
4	IGUANIDAE	<i>Iguana iguana</i>	Green Iguana			*	II	VPN	
5	IGUANIDAE	<i>Corytophanes cristatus</i>	Smooth Helmeted Iguana	*			II		
6	SCINDIDAE	<i>mabuya unimarginata</i>	Central American Mabuya	*			II		
7	COLUBRIDAE	<i>Oxybelis aeneus</i>	Brown vinesnake	*					

OD: Direct observation; R: traces and signs ; E: Interview key residents; CITES: Convention on International Trade in Endangered Species of Wild Fauna and Flora and Appendix I,II,III; SNV: National Wildlife Protection System, VNI: Indefinite closure and VPN: Partial closure ; UICN: International Union for Conservation of Nature