PROJECT DESCRIPTION

AUGUST 2020

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Our sustainable forestry plantations provide economic opportunities in one of the most remote rural regions of Colombia. Our strategic intent is to demonstrate global leadership in forestry products by pioneering and developing sustainable plantation forestry in the Orinoquia Region of Colombia. To do this, we acknowledge the importance of continuous learning and have identified areas for improvement.

We strive to balance the needs of the environment, wildlife, and communities by adopting an ecosystems-based approach that includes land stewardship, the inclusion of diverse stakeholders, and promotion of local economic development.

The decision to base our operations in Colombia was based on over two years of research and stakeholder engagement. To ensure our operations have a positive impact required us to conduct an extensive due diligence process to select a region that both we and our stakeholders felt confident could experience an overall betterment as a result of the establishment of a sustainable plantation forestry.

After an exhaustive process, the Vichada region of Colombia was identified and selected as an ideal location for several reasons.

The total area of Vichada is just over 100,000 km2 (10 million ha), which is primarily classified as degraded grasslands. These lands have historically had little to no productive use. Local farmers have used it for grazing a few head of cattle, but due to a lack of infrastructure and market access, they are suffering, and cattle farming has decreased considerably. Residents purposely set uncontrolled grassfires over vast areas to clear out the existing grassland and to encourage the growth of new grass. These destructive burning practices further degraded the land. Wildlife has been negatively impacted.

We saw the potential to improve these lands through plantation forestry operations and effective land stewardship practices. We are committed to using 65% of the land area under our ownership for active plantations, which has proven to improve the habitats of non-planted areas. The balance of the open area (35%), which comprises grasslands, wetlands,

and riparian areas, will be categorized as conservation areas. Management of these conservation areas provides us with the opportunity to protect the biodiversity of the region.

Research revealed that our operations would not adversely impact non-replicable cultural property (e.g. archaeological, historical, or religious sites), sites with unique natural values or intangible cultural heritage (e.g. social practices, rituals, and festive events). All sites of cultural significance were identified and mapped to ensure protection and access before operations commenced. These sites were recorded within the GIS system in our forestry management software, to ensure operations do not affect them in the short or long term. Where these are identified in the future, specific management plans will be drawn up with the local community to ensure that they are protected and managed in accordance with the local wishes and requirements.

As part of our due diligence, we undertook a risk assessment to determine if our operations would infringe on high conservation/biodiversity value areas (HCVA). This Environmental and Social Impact Assessment (ESIA) revealed that the area of operations has limited HCVA, which we can then protect, and it identified that we should not expand our operations south of the Bita River. This assessment revealed that we have an opportunity to play a meaningful role in protecting and preserving biodiversity in this area.

The Vichada region is one of Colombia's most impoverished regions, having the second lowest GDP per capita, less than half of Colombia's national average. 45% of Colombia's countryside population lives in poverty (19% living in extreme poverty). Colombia experienced 53 years of civil conflict, which has resulted in displacement and diminished employment opportunities. This region has not previously had a legal, commercial, or industrial framework for employment and has subsisted in an informal environment. We are the first large scale economically viable and legal enterprise in the region apart from cattle farming. We have the opportunity to make a positive difference in this region through social and economic development initiatives.

FFC intends to use only 65% of its total area for plantation forestry and dedicate 35% of its total area to conservation, of environmentally sensitive areas and to the planting of native species. The remaining area is used for roads and infrastructure.

1. LOCATION AND GEORAPHICAL LIMITS OF THE PROJECT

The project is located in Vichada department, in the Puerto Carreño and La Primavera municipalities. At present more than 90% of the project is in Puerto Carreño and the expansion plan includes part of the la Primavera municipality.

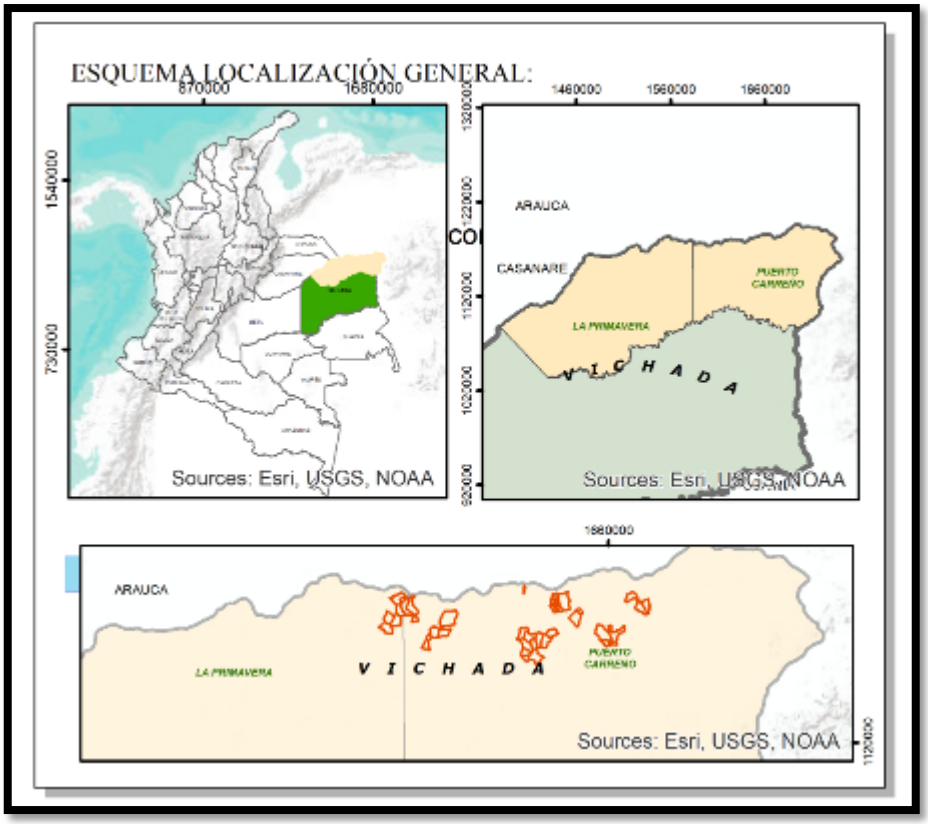

Figure 1. Location of the project (Vichada department)

Vichada lies in the Llanos of the Orinoco River basin and is bounded north and east by Venezuela and south by the Guaviare River. It is drained by several navigable tributaries of the Orinoco River, including the Meta (along the northern border). As elsewhere in the Llanos, cattle raising is a dominant economic activity. There is also some fishing and hunting and gathering. The only major road roughly parallels the Meta River from Villavicencio, in Meta department to the Puerto Carreño, the departmental capital of Vichada, on the Orinoco, the eastern border of the department.

Base on the DANE (National Administrative Department of statistics) projections to 2020, the current population of the Vichada department is 112.958 inhabitants, which is 0.23% of the national population, located in an area of 105.947 km2 which is 9.2% of the national territory. Around 25% of the population is located in cities and 75% is located in rural areas where the density is less than one person per square kilometer. Puerto Carreño municipality has around 20.294 inhabitants and La Primavera has 9.608 inhabitants.

2. PROJECT ACTIVITIES

The plantation's main objective is the production of fast growing, high yield, certified hardwood which are chipped and sold domestically or internationally to be used for energy generation from biomass or be converted to pulp wood. We implement the most appropriate global business practices in all our operations, and plant two main commercial species, A. mangium and E. pellita; in addition we have provenance trials of different species as part of our genetic improvement programme mainly composed of *Eucaliptus urograndis x urophylla*. We are committed to obtaining Forest Stewardship Council (FSC) certification for the products we will market. Operationally, we verify that all activities carried out are in accordance with the principles of social and environmental responsibility. All operational activities will be managed in accordance with local, national, and international laws and regulations.

2.1 Description and justification of species use

Acacia mangium Wild

This species is native to northern Australia, eastern Indonesia, the Moluccan Islands and Papua New Guinea. It develops well on eroded soils with steep slopes, which may be deep or shallow, and compacted. In relation to its morphology, it is a tree that can reach a height of 20 to 30 m, its leaves are simple filodios and single-edged in adult individuals, although they appear composite for a few weeks after germination. Flowering occurs from the end of the rainy season until the middle of the dry season and the fruits appear five to seven months after flowering. Its wood is used for construction, charcoal and pulp production, and erosion control. It is also used as fodder, fuel, tannins, nitrogen fixation, and erosion control and beekeeping (World Agroforestry Centre, 2009).

Eucalyptus pellita F. Muell.

This tree is from northern Australia and Papua New Guinea. It can reach heights of up to 40 m, with a thick shaft and a branched crown, rough, sturdy bark, and moderately heavy, strong and durable reddish color wood. The leaves are sub-opposed, pecioladas and lanceaolate in juvenile stage and later alternate or sub-opposed in adult stage. Simple, axillary inflorescence. The fruits are sessile or with short pedicel. (World Agroforestry Centre, 2009). It grows in clay loam and sandy loam soils. It does not resist floods. Uses: Wood, essential oils, firewood, beekeeping (provides ample amounts of pollen for beekeeping).

Eucaliptus urograndis x urophylla

This tree originates in Indonesia. It can reach heights of 45 m in favorable growing conditions; the shaft is straight and reaches up to 2 m in diameter. The bark varies according to moisture and altitude, is generally sturdy and sub fibrous, smooth, and shallow, and reddish brown to brown. Juvenile leaves are sub-opposed, closed and widely lanceolate. Adult leaves are sub-opposed to alternate phyllodes, with little visible lateral ribs. The inflorescence is simple and axillary. Seeds are small, angular to semi-circular, black. It grows in mountainous landscapes and valleys, in deep, moist, and well-drained soils, with acid to neutral pH, in soils derived from volcanic ash or metamorphic rocks (World Agroforestry Centre, 2009).

VARIABLE	Species needs			Project area conditions
	E.pellita	A. mangium	E. urophylla	
Precipitation (mm/year)	900-4000	1500-3000	1000-1500	2353
Temperature range °C	24-34	18-28	8-29	28,5
Altitude (m.s.n.m)	0-800	0-800	0-2700	80-130
Drainage	well drained	wide range	well drained	Preference for land with a high percentage of well drained areas.
Soil depth	deep	Shallow to deep	deep	Preference for land with deep soil depth.
Soil texture	sandy, clay, and silty loam			Sandy loam, sandy, clay loam
Topography	Flat to uneven	Flat to sleep	Flat to uneven	Flat land

Table 1 Comparison of the project area's environmental conditions and the species' needs

According to the table above, it is evident that the selected species match the project area's biophysical characteristics. Additionally, we designed a decision tool to determine the site qualities and particular conditions for the establishment of acacia and eucalyptus stands.

2.2 Forestry Management Cycle

We implement global forestry management expertise and access to world class forestry with our operational management team. Specialist forestry information supported by forestry support systems ensure that every member of the management team is able to formulate decisions using reliable data and based on strategic long term fiber resource plans. These include long term fiber resource plans (LTFRP) covering 15 years, tactical plans (3 – 5 years) and include an annual plan of operations (APO) with monthly and daily productivity and financial controls.

In order to achieve the desired long-term sustainable fiber supply, a thorough and detailed planning cycle is required. Reliable natural resource data - such as climate, soil data and topographical information, together with a thorough understanding of species, allows recommendations to be made that will optimize the fiber resource for the specific market and at the same time ensuring that it is socially, environmentally and economically sustainable.

The translation of this opportunity through the production of high yielding, quality forests is a key component of the value adding which the tree resource can provide. Maximum productivity per unit of time is a forestry imperative, measured both in terms of volume (measured in MAI) and in additional Gigajoules per hectare (ha) or pulp yield off the landholdings. At the same time the needs of the different processors must all be part of the economic drivers of the plantation management plan. This includes bioenergy plants, pulp and paper mills, medium-density fiber board (MDF) mills and is driven by density and specific product yields.

Targets and timelines need to be set and captured through specific management plans, and the influence of these improvements should be built into the business strategies. These are extremely powerful tools in the determination of the best way forward and will provide us

with the unique opportunity to strategically determine how to best optimize our resources and investments. We have the knowledge base, the understanding and the tools to guide the management of the fiber resource. This principle must be continued through to the next important step and move to an understanding of the influence, which can be exerted, on the quality and characteristics of the final product. To do this the effects of the fiber characteristics and other factors in the final process needs to be understood and integrated into the strategy. This will bring together the entire value chain from tree breeding, through nursery propagation, silviculture and tree growing, to harvesting and logistic efficiencies, through to processing for the end consumer.

The key focus areas of our forestry management are:

- Maximize the growth and yield, with specific defined product requirements, from the site
- Cost benefit operational effectiveness in silviculture, harvesting and logistics
- Sustained yields between consecutive rotations
- Achieving socially, environmentally, and economically acceptable standards

The various dynamics that influence the forestry management cycle need to be understood as part of the operating environment, whilst fully appreciating all of these aspects and the interrelations that require consideration:

- Natural resource data
- Planning
- Research and tree improvement
- Nursery practice
- Silviculture
- Forest protection
- Social and environmental
- Forest engineering
- Measurement

All these components need to be coordinated and integrated into the plantation management plan, ensuring that there is transparency and enabling all levels of management to have timely, relevant and meaningful information on which decisions can be made. We will implement a well-structured documentation system which will provide all

the appropriate information required by the employees to undertake their specific responsibilities through access to a web based documentation control system that provides collaboration in real time with colleagues and other departments, ensuring current and appropriate information is available at all times to enable decision making.

The planning and technical plan has different components, all of which need to be integrated to ensure that there is total alignment between all the disciplines and that operations, through the silvicultural plan is provided with appropriate and relevant technology that can be effectively and efficiently applied under the specific operational conditions. The different disciplines included in the planning and technical plan are illustrated below.

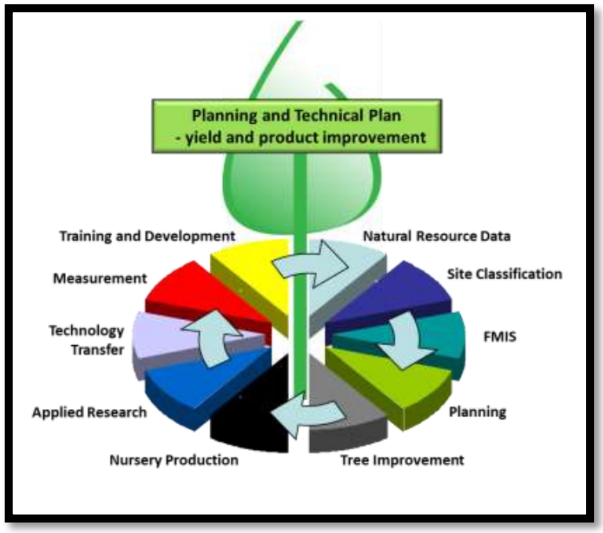

Figure 2. Planning and technical plan.

Natural resource data

The natural resource data for our geographical area includes soils, topography, climate and geology. These resources will be discussed in some detail to provide clarity. The concept of site classification will be discussed, and a broad description of the prevailing site conditions will be included to provide an overview of the area. Finally, the type of information that is provided with each detailed soil map is discussed. The issue of terrain classification will also be described in this document. This classification is mainly for the purpose of harvesting planning. Site classification is our ultimate objective in gathering all the important natural resource data available. In order to optimize forestry management, each different

component is essential in developing our understanding of what each contributes to the site and the landholdings.
A site can be defined as an area of fairly homogeneous soils (+ geology), topography, and climate. The three major components that will make up the system and which are principle drivers in the productivity index are:

- Climatic Zone – defined by the mean annual temperature (MAT). This is probably the key driver in site species matching and allows us to identify the key species for the different sites.
- Rainfall Category – by using different rainfall intervals to allow us to establish the potential growth for the different areas. These also provide us with guidelines as to how suitable the areas are together with the MAT information that will contribute to the site species matching
- Land Capability Class – by clearly defining the soil and topographical features we are able to understand the impacts and constraints on the different operations. However, once we incorporate the climatic information - more specifically temperature and the amount and distribution of rainfall - we will be in a better position to initially estimate a site's potential, and later to develop a productivity index.

Soils

It is our policy to understand the soils of all our plantation areas. Obviously it is not possible to undertake a detailed soil survey of all our areas in one operation due to the costs and specialized manpower involved. It is, however, the responsibility of operational management to ensure that they have sufficient information regarding the soil characteristics to optimize the operational activities. Where detailed soil surveys are to be done, these surveys are done at 1:10 000 scale using a 150m grid survey pattern. Soil information is the basis for site classification, terrain classification and infrastructure planning, all of which are crucial inputs to the final working plan of an area.

The project area contains the soil orders Ultisols, Oxisols and Entisols. The ultisols are represented in profile No. 4, which have an argillic horizon that is characterized by the removal of clay from the upper to lower horizons through the eluviation process. These soils are found in the lower terraces farthest from the rivers. Oxisols are the most abundant soils in the region and are characterized by clear colours and low organic matter content that includes the surface horizon. In the order of the entisols, an albic horizon was found from which the clays and free iron oxides have been leached. These soils

represent during the winter season, when they are washed by infiltration water, which causes a diminishing of the bases and acidification of the profile. The soils of the region are chemically very acidic, with low nutrient content and low fertility, and their organic matter and phosphorus content is very low compared to aluminum content. The formation of soils from igneous rocks is observed near the urban area of Puerto Carreño along the Orinoco River, in the sectors of Ventanas, Islas el Pañuelo, Mis Amores, Guarida, Bachaco and in the locality of Casuarito (Alvarez & Suarez, 1965) The following is an analysis of soil pits in the area of direct influence of the project, carried out during 2018 (Table 2):

Sampling point	**Effective depth (cm)**	**MUNSELL Classification**		**Texture**
		Horizon A	**Horizon B**	
Acacia mangium TR	>60	10 R 5/8	2.5 YR 5/8	40% sand, 40% silt, 20% clay
TR open area sandbank	>60	5 YR 3/3	2.5Y 5/4	50% sand, 40% silt, 10% clay
Am lot A106 permanent plot	50	10 YR 4/3	5 YR 5/6	30% sand, 30% silt, 40% clay
Ep Lot A115 permanent plot	>100	5 YR 3/4	7.5 YR 5/6	10% sand, 40% silt, 50% clay
Am Hato nuevo seed orchard p	>100	10 YR 3/4	5 YR 5/8	10% sand, 30% silt, 60% clay
Hato nuevo open area p	>100	7.5 YR 4/6	5 YR 5/8	30% sand, 20% silt, 50% clay

Sampling point	Effective depth (cm)	MUNSELL Classification		Texture
		Horizon A	Horizon B	
Sonda de humedad Am Paraiso PR.	>100	10 YR 3/4	7.5 YR 5/8	40% sand, 20% silt, 40% clay

Topography

The topography of an area is the physical nature of the land surface, including slope, slope shape, slope length, aspect and altitude. For two-dimensional mapping, topography is displayed in the form of contour lines which are imaginary lines on the land surface that connect all points of equal altitude. The degree of accuracy of a contour map is inversely proportional to the contour interval. The contour interval is the height difference between successive contour lines. The higher the contour interval, the lower the accuracy of the contour maps.

Climate

In order to have a thorough understanding of the prevailing climate of an area, the climatic elements that need to be considered are; rainfall, temperature, frost, snow, hail, mist, humidity, sunlight hours and wind exposure. At most localities on our landholdings very few, if any, of these parameters are measured and recorded. For this reason, we use data from existing weather bureau and other external stations to predict the climatic conditions on our landholdings using various climatic models.

According to historical data recorded by the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) climatic stations present in the study area, the average annual multiannual precipitation in Puerto Carreño is 2,243.6 mm. The rainy season is between April and November, while the months from December to March are characterized by low rainfall (see Figure 3).

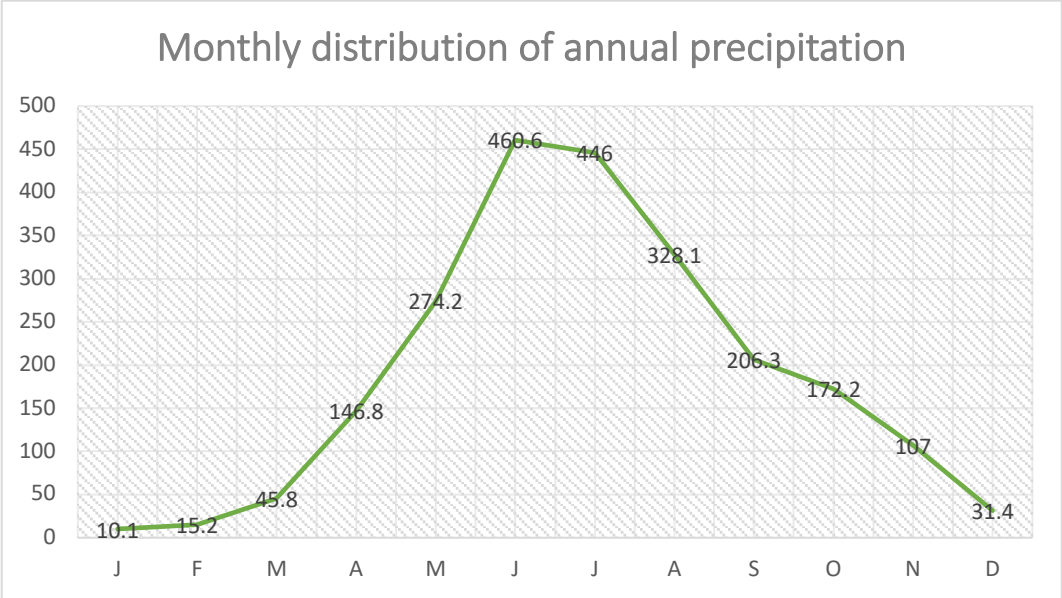

Figure 3. distribution of annual precipitation

In general terms, the project area is located in the tropical humid forest life zone (bh-T). The dominant climate in the zone includes temperatures between 26 - 28ºC, with marked seasonality and monomodal type: warm thermal floor, and super humid. The area has a monomodal climate, with a dry season between December and April and a wet season from April to November. Annual precipitations 2,398 mm, with an average monthly precipitation of 199.8 mm. Additionally, FFC performs its own measurements with several stations on farms with operations. Based on rainfall distribution, the FFC establishes the annual planting cycle from mid-March to late November. Both at the beginning of the cycle and at the end, the use of hydro retainer is included within silvicultural practices.

Geology

Geology plays a vital role in the development of different soil conditions and is, therefore, also significant in our management decisions. In many cases it governs the nutritional status of the soil and also determines the physical properties such as color and texture. Geological information is available from the geological survey, but this is generally at mapping scales that are too broad for operational decision-making. For this reason, the soil survey programmed includes an aspect of geology which is then built into the soils database and mapped at a scale of 1:10 000 which is perfect for operational management.

The project's area of influence is made up of Precambrian rocks belonging to the Amazon Craton located in northeastern South America, which is divided into the Guiana Shield and the Central Craton of Brazil (or Guaporé). In Colombia, the Tunui group (Cinaruco-Venezuela) and Parguaza granite are found in the migmatite complexes of Mitú. The latter formation is located next to and beside the Orinoco, from the confluence of the Vichada river to Puerto Carreño with isolated outcrops in the Meta River, ending between the departments of Arauca and Casanare. The Orinoco mega-watershed sedimentation makes up the sedimented areas mainly by drains from the Eastern Cordillera and the Amazon Craton. This sedimentation accompanied the rising of the mountain range, forming large plain landscapes associated with the different phases, mainly tectonics and erosion deposition processes. In the areas that received sediments formed peneplains, piedmont plains, and overflow plains, among others. The department of Vichada landform is constituted by extensive plains belonging to the Eastern plains of Colombia, conformed by a set of peneplains with different degrees of dissection in sediments of the tertiary and quaternary, which extend from the foothills of the Eastern Cordillera to the Venezuela, on the basin of the Orinoco River. Near the left bank downstream of the Orinoco River there are outcrops of igneous Precambrian rocks in the form of small hills or Inselberg that stand out from the peneplain. Three main fracture groups were identified in the granitic bodies, which are characterized by a main tendency of diaclasas in an east-west, northeast-southwestern direction, and other tendencies in a northwest-southeast direction.

2.3 Project activities

To ensure the potential for wood production and sustained yields, it is necessary to integrate, along with the research programs, all the disciplines within our forestry. This is achieved through the identification of two main components namely: classification and characterization of the site added the best operating practices of each of the activities within each of these components.

Main activities of the forestry activities are:

- Site selection
- Land acquisition
- Nursery
- Plantation planning

- Site preparation
- Plantation establishment
- Maintenance
- Harvesting
- Transport and logistics

2.3.1 Support activities

2.3.1.1 Land Rights Acquisition

In the two years leading up to Forest First Colombia's incorporation in 2010, we searched for the optimal location to establish a forestry business and we visited and evaluated a number of countries in Asia, Africa and Latin America as it relates to soils, climate and legal environment. We learned a lot about the shortcomings in the legal environments of China, Indonesia, Ghana and other places as it relates to land ownership in the context of the many decades that are required to optimize a forestry business.

We found that Colombia's legal system and laws compare favorably to those we had encountered outside of the United States and Europe and we concluded that while all land ownership – wherever in the world – has attendant risk, our job is to minimize that risk to the extent possible.

In Vichada, the Colombian government owned large tracts of land until well into the second half of the 20th century. The Colombian government does not lease the land it retains. However, Law 160 provides a mechanism whereby people can occupy of a certain parcel of land, cultivate that land and after a number of years be granted title to that land. There is lots of land available in Vichada which is in various stages of titling pursuant to this mechanism. Because of the many uncertainties around the completion of each of the titling steps, we determined not to participate in this titling process for our account. Instead we pursued only fully titled land. We also determined not to lease land from people who were participating in this titling process. We felt the risks were too great that our lessors would not complete the titling process, the land would revert back to the state and the burden would then be on us to prove ownership of the trees to the government in a judicial process that could take many years.

As a result of these considerations we have a risk assessment process that takes into consideration the conveyancing history of the title, the forestry aptitude of a property as well

as the conservation and environmental considerations of the site. We also take care in evaluating the social conditions present at the time of land right acquisition.

FFC undertakes a social, environmental, technical, and legal risk assessment on land parcels prior to securing land rights. The objectives of conducting a risk assessment review for land rights acquisition are:

1. Ensure the title was properly acquired, is legal and valid.
2. Ensure the parcel of land is suitable for forestry activities and determine its plantable areas.
3. Ensure the parcel of land is free from cultural heritage sites, invasions and/or illegal occupiers, and that there are no additional claims to that parcel of land.
4. Ensure the parcel of land is free from indigenous people occupation and that there are no traditional or customary rights or uses;
5. Ensure the property is not in a protected area or other restricted areas;
6. Identify sensitive environmental areas for set asides, exclusion and future conservation areas (e.g. wetlands, riperian, gallery forest, etc.);
7. Identify local community cultural heritage sites to allow preservation and free access to these sites; and
8. Avoid forced eviction and displacement of people (including economic displacement).

In order to accomplish these objectives, FFC engages with the landowner to solicit all relevant documentation for the analysis of the title to develop a legal due diligence report which incorporates relevant technical, environmental and social data identified through a risk assessment.

2.3.1.2 Environmental aspects

It is essential that forestry management practices wise and sustainable utilization of all resources, products, and opportunities within the forestry area for the benefit of all stakeholders. Independent environmental impact assessments will be conducted in order to minimize, monitor and measure the impact of all operations on biological biodiversity, water resources, soils, fragile ecosystems, areas of special interest (ASI), and on neighboring communities. We are committed to the independent certification of our forestry operations in order to achieve and to meet the principles and objectives of an applicable forest certification system.

Bio-geographical considerations.

Landscape processes like the dispersal and migration of plants and animals via corridors have been incorporated into the plan from the outset. The conservation of vegetation and habitat types has been identified and recorded together with appropriate management plans in the FMIS. We will not create plantations in any wetlands and riparian zones and conservation areas will have links to different unplanted areas so as not to be a threat to the landscape processes.

Areas that have been identified as high conservation value are not be afforested. Conservation areas are consolidated in order to have a few large areas rather than many small ones. Open grassland and other natural vegetation types are linked by means of corridors. Rare, threatened, and endangered species are protected by allowing migration pathways and natural dispersal within an area, by keeping the genetic flow alive. Species richness increases with increased habitat size because larger patches of natural vegetation in between plantations can hold a more diverse range of plants and animals due to the increased number of habitats found in one large area, compared to several small ones.

Areas of Special Interest (ASI)

We identify and manage our ASIs which include forests, natural forest, national natural parks, areas with multiple or special vegetation types, habitats or localities where rare, threatened and/or endangered species are found. Threats to these areas include exotic weed species and non-adherence to management prescriptions resulting in loss of, or decrease in, numbers of plants or animals to be conserved and possible vandalism.

When we register an ASI we are responsible for the site and the associated management plan must be followed. Any actions which could destroy or degrade the site must be prevented. Once registered, it is important to report any adverse changes that may have occurred to the site. These sites can be used as examples of certain management practices and be used to promote our commitment to conserve the different habitat types.

Management for biodiversity

Riparian zones

Riparian zones are managed to maintain a range of vegetation types, habitats and ecological processes and act as corridors between natural vegetation patches, in addition to improving the quality of water.

All exotic weeds are removed from riparian zones and the debris resulting from this must not be allowed to enter the watercourse/stream. The riparian zone must be clearly and accurately demarcated by means of the wetland delineation procedure. Where possible the riparian zone can be bounded by low maintenance grassed roads. If this is not possible, the delineation must be clear to all the managers and contractors involved on the management unit. There should be an attempt to include some grassland on the outer edges of riparian forests and to link various riparian zones through natural corridors. Where burning is a management tool, it should be done in such a way that a patchwork of burnt and unburnt areas is left, because animals that occur in riparian zones are habitat specialists to some degree. Alternatively, only one side of the riparian zone should be burnt in a particular year.

Wetlands

All wetlands should be properly delineated, rehabilitated and conserved as important and valuable ecosystems, and functioning at maximum capacity. They must be accurately delineated according to the vegetation and hydromorphic soil types associated with permanent, seasonal, and temporary wetlands. Drainage lines, canals and other damage, including head-cuts and roads, must be rehabilitated to promote the value and functioning of a healthy wetland system. Through the preservation and rehabilitation of wetlands, biodiversity will be increased naturally because of the different habitat types occurring in a healthy wetland and the flora and fauna associated with them. Management plans are needed for large wetlands that have a big influence on the river systems and other ecotones that affect biodiversity directly.

Ecotones

An ecotone is an area where different biomes meet such as forest and grassland/or a plantation and grassland. In these areas the biodiversity is usually higher than in the surrounding areas, due to the edge effect and the law of interspersion. Ecotones contain a variety of vegetation structures and many important dynamic processes take place along them. Management procedures to mimic the natural landscape processes can also be applied to assist in the conservation of natural diversity in the catchment. Efforts should be made to minimize damage to ecotones during normal forestry operations. Ecotones need the periodic application of fire in patches, but these must be controlled with no roaring fires running up valleys into indigenous forests. Weeds must be eradicated. Periodic burning of

grassland/forest edges will promote dense ecotone structure formation, which will protect the forest and limit the establishment of alien vegetation.

Native forests

Native forest patches are to be managed with the aim of maintaining maximum biodiversity, excluding exotic weed species, and preventing damage by means of bark stripping, timber theft, and forestry operations.

Clearfelling into native forests is not permitted, and if it does happen the area must be rehabilitated. Where burning is necessary it must be allowed to burn up to the forest from only a short distance away and not on a wind front. Small forest patches are important features in the landscape as they provide refuge sites for animals and plants. Corridors will benefit genetic flow within species, preventing the possibility of localized extinction due to domination of excessive genealogy. Transect monitoring of the indigenous forests must be scheduled and should take place every three years.

Grasslands

Grasslands should be managed with the aim of maintaining maximum biodiversity. Burning of grassland is important for maintaining the biotic diversity. Burning too often will change the species composition to the detriment of the grassland type and the overall species diversity. Burning too seldom will cause the vegetation to become moribund and die in patches, creating the potential for erosion and exotic weed infestation. Depending on the grassland type, the average burning regime should be between one to three years. Overgrazing and stock numbers in excess of the carrying capacity not only affects the environment but decreases the carrying capacity of the land.

The intensity of the fire and time of the year plays an important role in the biodiversity management, as well as the size of area burnt. Very hot fires will often burn down into the root of the plant and kill or damage it. Topography, fuel load and climatic factors should be the main points of consideration prior to burning. Perennial grass species have a pronounced dormant period during the dry season, burning during this time does the least damage to the plant because most nutrients have been withdrawn from the sward and are stored in the roots. Grass should not be burnt before the first rains as this is known to do the most damage to the plant as the last reserves left after the dry period are put into the first growth of the early spring season, so burning at this time could easily kill the plant.

Fauna

The management objective of an indigenous animal community is to have genetically viable populations, in which the specificity of the gene pools is conserved and aimed at optimum biodiversity. Habitat destruction due to afforestation must be taken into consideration and in the case of rare or endangered species; a certain area, suitable to the particular specie should be reserved for its survival and linked with other similar areas. Persecution of certain reptile, mammal, and bird species due to folklore and myths should be addressed and the appropriate steps taken to educate the community and the guilty persons. Species most prone to this include most snakes, owls, and chameleons. Monitoring should take place on an ongoing basis to list and establish systems to monitor the status of rare or endangered species and the viability of the population sizes.

Soils

All forms of man and animal induced erosion should be identified and controlled. The aim of the rehabilitation is to effectively control soil loss from identified areas such as roads, extraction routes, tracker belts, quarries, and buildings. Management actions must be to map all the erosion areas and prioritize these for attention. The follow up of rehabilitated areas are as important as the initial phase.

2.3.1.3 Social aspects

We are committed to the principles of 'Corporate Social Responsibility'. We will therefore contribute to the sustainable socio-economic development of communities in and around our plantations by contributing to the economic, social, and educational well-being of the communities associated with our operations. All the forestry operations shall seek to contribute to the well-being of the communities in which they operate and need to be committed to the principle of a safe work environment and sustainable development. In the original social impact assessment, which was done in April 2011, it was determined that our operational "*area is a multi-cultural municipality which includes indigenous people, cattle herders, tenant farmers and rural local communities. It also includes areas of significant biological and eco-systemic diversity representing the folklore of the settlers of the Colombian plains"*. Based on these findings, the impact assessment calls for the design and implementation of practices oriented at maintaining the region's culture and

ecosystems. As custodians of this land resource and a partner in this region, we intend to responsibly manage all this diversity.

Corporate Social Investment

We used stakeholder identification tools in a Participatory Rural Assessment (PRA) for the identification of potential activities to be implemented in collaboration with other stakeholders such as local governments, government technical departments, other enterprises, and specific NGO's. The PRA is one of the many tools which can be used in engaging communities to achieve mutually accepted outcomes. Based on the findings of the PRA, our Corporate Social Investment (CSI) initiatives focus on a few key areas, including employment and skills development, education, health and environmental awareness. Our energies are committed long-term to selected sustainable projects where the adjoining communities can benefit the most.

The objectives of our CSI projects include the following:

- Engage and understand community needs
- Create a baseline level for any certification scheme (social and environmental)
- Initiate a long-lasting relationship with communities / households / stakeholders in and around the plantation areas.

Employment

The Vichada region has historically been an area with low population density, few economic opportunities and little or no formal employment. Although Colombia is not considered to be an emerging economy, the Vichada region, and specifically the area where we operate is comparable to emerging African countries, due to the poor state of development in the region. The Vichada region is characterized by either low employment or high unemployment and an annual GDP per capita of USD3,537 among its 65,282 inhabitants (2015) which is well below the average for Colombia. The remote area outside of Puerto Carreño, is estimated to have an annual GDP per capita of USD1,889 which is comparable with Kenya with a GDP per capita of USD1,455. To the extent there has been employment in the area, it has been for people with low skill levels. The main employers in the region have been government institutions, who have recruited the necessary skills from other areas in Colombia. In the rural areas and villages, the only employment opportunities were temporary in nature and were usually associated to the narcotics trade which was extremely erratic and exploitive of the local communities. We are providing a growing number of

Colombians with stable, good paying jobs above the legislated minimum wage levels. Our workforce consists of over 75 contractor employees and 100 direct employees (December 2019), all of whom are based in Vichada and now meet a range of skill requirements. As required by law, all the associated benefits of medical and social contributions plus taxes are being paid, while for the first time employees are also enjoying the benefits of a regular monthly income, spread across the genders (31% are female) and paid leave. We are developing the work force with continued training to extend the existing skills sets and to pass on the acquired skills to new joiners. Our culture is to provide a fair, safe and sustainable work environment and to attract, retain and develop a competent and efficient workforce.

Education

Our philosophy regarding education is that education is a great equalizer in any country, including Colombia. Too often, opportunity is denied to young minds before they ever enter formal education. Due to shortages of public resources, poverty, malnutrition, disease, cultural beliefs and traditions, and geography, the majority of children are never able to compete on an even educational playing field, and are thus relegated to entering the same cycle that engulfed their forebears for generations before them. Academic rigor and challenge are denied to poor children for a long list of political, geographic, gender-based and historic reasons over which they have had no influence. Our preference for investing in the educational infrastructure is based on the tried and tested principle that putting children into classrooms and into a formal learning environment delivers a high return on investment in upgrading the quality of education and of educational access in an economic environment where government educational expenditure is failing to keep up with the demands of growing rural populations.

- We have educated the local population on better cattle farming and crop cultivation practices as well as proper treatment of the environment.
- We continually educate the community and its workforce in the forestry industry, provide them with significant skills and help them with literacy and additional development programs.
- We created a vegetable garden and educated the community on effective methods of growing vegetables.

- We invested in, and improved, the conditions of the primary and secondary schools in the area.
- Income stability in households has led to an increase in school attendance.

Health

We engage in both direct healthcare activities and in increasing access to health care facilities and services for our labor force and the surrounding communities, in particular for women and children. Health related projects strive to promote and improve existing government services and to supplement government infrastructure, raising the standard of care for target groups of the population. Our primary health care project consists of supplying medicines to the facility in La Venturosa because the national health department does not provide medicines. The nurse provides a list of medicines every three months and we purchase these medical supplies and deliver them to the local clinic. These are the only medical supplies that are available to the community. We also arranged for the visit by the medical personnel from different military forces to provide consultations across a range of medical disciplines including general medical practitioners, optometrists and gynecologists. These are not ordinarily available to the community. Some of the medical supplies provided by us and the medical day arranged with the Marandua air force base gave local people the opportunity to see a doctor and/or a dentist for the very first time.

Livelihoods

Another critical focus area for us is the alleviation of rural poverty and livelihoods enhancement. We seek to enhance existing livelihoods and empower Colombia's entrepreneurial rural farmers and small business owners through the provision of capacity building and critical capital investment interventions to unlock economic development potential. Throughout the Vichada region the predominant cattle grazing system is extensive free-range ranching. Currently, we are researching programs to improve cattle pastures and crop cultivation in order to assess their viability and whether they are desirable to our neighbors. There can be a significant improvement in the productivity of cattle farming through the introduction of improved pasture grasses to replace free-range ranching. We will demonstrate to local farmers what can be accomplished by using different grasses so they can use less land for cattle farming and retain land for alternative uses in order to reduce the risk for the farmer of being reliant on one land use and to improve their economic situation.

Health and Safety

The key features of this aspect cover all issues relating to personal working in our forestry operations. This includes all operational procedures for the different activities, including the personal protective clothing (PPE) requirements and the requirements for the use of machinery. Worker health related issues are also covered. As an example, in the harvesting operations, the regular use and monitoring of rehydrating liquids is a requirement due to the hot conditions in Vichada. We monitor injuries with a target of ZERO lost time injuries (LTI). We use a three-tiered system as follows:

First Aid Case (FAC)

A situation where a worker requires treatment from the on-site first aid bag and can continue with work immediately

Medical Treatment Case (MTC)

In such situations a trained medical professional is required to treat the employee after which they are able to resume work.

Lost Time Injury (LTI)

The injury is of such a nature that following medical treatment the employee is unable to return to his/her normal work and is required to have a few days of recovery before resuming work.

We use a three-card system to assist in instilling a safety culture into the operations. A yellow card infringement takes place where an unsafe act occurs. A red card infringement is a serious infringement where the entire operation is shut down until such time as a thorough investigation of the incident has occurred and it can be determined that ever effort has been made to ensure that a recurrence of such an incident is unlikely to occur again. The third card is a green card which recognizes a person's efforts to prevent a possible accident and injury to a fellow employee. Continual reinforcement of working safe and taking care of yellow carded employees is conducted through posters, toolbox talks and clear demonstration from management through *"Visible felt leadership.*

2.3.2 Nursery

Figure 4. Nursery

The nursery's goal is to produce high quality seedlings at a reasonable cost. The quality is determined if the seedlings are healthy, come from genetically improved seed, have a good stem to root ratio, are free of diseases and have high vigor generated from the process of "rustification". The Plant Quality Index (PQI) was created, taking into consideration these and other variables. We have our own nursery with the capacity to produce five million seedlings per year. Initially, genetic material from a local supplier was used, then seeds were imported and now the intent is to collect seeds from our "plus trees" themselves. The Jiffy system is used as substrate. We have a genetic improvement plan, focused on improving productivity (m3/ha), among other factors.

Our permanent nursery is located at San Cristóbal outside of the town of La Venturosa. This is where the plant material is produced permanently for 10 months of the year to supply the requirements for planting in the field and to the supply nurseries in other properties. We have a supply nursery at Toro I with a capacity of 60,000 seedlings.

2.3.3 Plantation Planning

Our strategies for plantation establishment incorporate both assessment of land for plantation suitability and measures to prevent negative impact on key biodiversity and social values. The methodology, incorporating analysis of imagery and ground-truthing exercises, is robust and is considered sufficient to protect key biodiversity values. These processes (or an abbreviated version) can be incorporated into the pre-acquisition assessment to reduce

the likelihood of acquiring land that has a high proportion of high conservation value land from an environmental and/or social perspective. The process includes the following stages:

- Title deed property boundary – first level planning, surveying, and compartment identification.
- Raster image and boundaries – specific ground features are identified, physical boundaries checked, and high conservation values identified prior to land use.
- Normalized Difference Vegetation Index (NDVI) – a numerical indicator using visible and near-infrared bands of the electromagnetic spectrum, adapted to analyze remote sensing measurements and whether the target area contains green vegetation, assess the condition of gallery forests, and to initiate wetland delineation.
- Drainage Line Capture – Surface waters that can be seen on satellite imagery are digitized.
- Morichal / Wetland Interpretation – Topographer uses drainage lines and satellite imagery to digitize the boundaries of riparian vegetation. Features captured during ground truthing exercises (such as areas of cultural significance) are digitized.
- Buffer Zone Protection – buffer areas are digitized, in-line with national and regional legislation.
- Wetland Area Interpretation and Buffering – On-site visits are conducted to ground truth NDVI and satellite imagery analysis and conduct soils analyses. Temporary or permanent wetlands are further delineated to inform management. Areas surrounding wetlands are buffered to ensure no operational activities are conducted within these protected areas.
- Ripio Zone Buffering – As with riparian and wetland zones, ripio areas are identified.
- Infrastructure and Roads – initial road layout and plantation design are conducted. Road design seeks to utilize optimal access and minimize hauling distances.
- Plantation Design – compartment layout and species allocation is then determined
- Compartment Details – the final stage is the allocation of compartment numbers and uploading details into Microforest to inform operational management and prepare for site preparation activities.

Figure 5. results of planning process

2.3.4 Silviculture Operations

The objective of all silvicultural operations is to ensure the optimum long-term sustained site potential of our most important resource, the land. To achieve this objective it is essential that the silvicultural plan provides the forester with all the latest, most useful and applicable technology and information emanating from research institutes, the industry and expertise both locally and from within FFC. The plan is an aid to allow the forester to strive for field excellence in all silvicultural operations and to ensure the optimum productivity of high-quality fiber at the most cost-effective price. Site optimization is a key focus area during this phase of the development. This is achieved through focus on these key silvicultural objectives:

- Site Species matching
- Full stocking
- Uniformity
- Healthy, vigorous growth.

In order to obtain these objectives, the following principles of good silviculture must be met:

- Site Species Matching. Careful matching of the correct species to the site to ensure optimum yields, bearing in mind the market constraints.
- Optimum Land Preparation. Adequate soil tilth must be created to allow rapid early root growth and even stands through optimum water and nutrient uptake.
- Optimum Stocking. Planting and survival of the correct number of trees to optimize the site potential.

- Timely Fertilisation. Use of the recommended fertiliser types, quantities, and timing of application so as to ensure early seedling vigour, site capture and enhanced yields.
- Weed Control. Weeds compete for nutrients and moisture and result in reduced growth and crop mortality. Therefore, it is essential to have competition free crops until site capture through economic weed suppression.
- Maintenance. Management of the regime according to the plan to ensure appropriate fiber quality at rotation age.
- Forest Protection. Diseases affect tree growth and therefore site potential. Ensure all the above principles have been applied to minimize crop stress and disease occurrence.

To provide this information, the plan must be site specific and integrate all the disciplines within the silviculture cycle (see figure below). This will best be achieved through the identification of two core components, Microforest, the forestry management information system used for all planning and management controls (see Planning and Technical Plan) and best operating procedures (BOP's) for each of the activities. Within each of these two components, the forester will have data at his disposal with which to make decisions so as to ensure that the appropriate technology and management is implemented.

Silviculture Regime

The approved short rotation eucalypt regime ensures that the supply of fiber from the land is cost effective and meets the specific requirements of the market.

SPECIES	CRITERIA	DESCRIPTION
Eucalypt and Acacia species	Rotation	7 years
	Stocking	1333 SPH
	Espacement	3,2 x 2,4 m

Silviculture Targets

It is critically important that there are targets against which the operations and different activities can be measured. These have been determined through the site potential and conditions which we have experienced since the inception of the project. We adjust our targets over the years based on the research findings and improvements in techniques.

The current targets are as follows:

- Species ratio at planting of 100% eucalyptus. We have planted acacia between 2010 and 2019 when we decided to plant only eucalyptus excpect in those areas where acacia needed to be replaced
- Site species matching correctly applied as per the plan
- Optimal stocking after planting at:
    - 30 days >98% (1,333 sph).
    - 12 months > 95% (1,292sph)
    - Rotation age >92% stems at harvest
- Tree height an average of 5 meters at 12 months
- Tree height uniformity at 12 months of ±25 cm.
- Tree diameter at breast height (DBH) at 12 months of 5,6 cm.
- Seedling plant quality index (PQI) at planting a minimum of 7.

Silviculture Standards

Based on the targets and the exceptionally good growing conditions, it has become evident that these relate to agricultural conditions and the window of opportunity for the optimization of the tree growth is very tight like in agricultural crops. As a consequence the table below has been developed to provide the forester with the standards required for the different activities.

Activity	Time Prior to Planting	Comments	Reference
Design of the plantation layout and the demarcation of compartments	6 months to 1 year	Roads, compartments, site classification (soil), weeds, species selection, planting season, plan of seedlings per farm.	
Site clearing	6 months to 1 year		
Seedling plan to the nursery	6 months to 1 year	Based on site species and monthly planting plan	

Activity	Time Prior to Planting	Comments	Reference
First pass land preparation	3-6 months	Using GPS technology for rows	
Second pass land preparation	1-3 months		
Ant control	21 days		
100% preplant herbicide application	3-7 days prior		
Activity	**Time After to Planting**	**Comments**	**Reference**
Mechanical planting with fertilizer		Plants of acceptable quality, exact spacings	
Manual planting			
Manual fertilizer at planting	3-5 days		
Blanking	Maximum of 21 – 30 days	Application of 50% of original fertilizer rate	
Ant control follow up	Constant observation	By contractor, controller, and supervisor.	
Interrow weed control	When necessary, green and max. weed height of 30 cm, with tractor		
Line clean weed control	>30% ground coverage by weeds and or weeds>20 cm	Application with knapsacks with guards to prevent herbicide contact with the trees.	
Follow up fertilizer	6-8 months	Dependent on the rain and weather conditions	
Corrective pruning of acacias	7-8 months	75% of tree height to maximum of 3,5 m.	

2.3.5 Land preparation and adaptation

Two fundamental preparations are made: first and second pass of implement with hydraulic and mechanical machineries. This preparation is not on 100% of the surface. For each hectare approximately 34% is prepared. Strips or rows are opened with discs that generate the place of placement of the seedlings we call ridges to improve drainage. It is necessary to make a high ridge for two reasons. The first reason is help trees gain height, as there are precipitation events with very high intensity that temporarily flood the stands, but thanks to the ridges do not drown seedlings. The second reason is that the ridges prevent erosion and waterlogging after rainfall.

These two activities will be between two and four weeks apart. During those two to four weeks after the first pass, wind, precipitation and solar radiation contribute to the weathering of the soil masses and then the second pass disintegrates said masses of soil into smaller size masses that are suitable for better root development. The orientation of the lines will be done with a GPS system guaranteeing the reliability of spacing.

Figure 6. Land preparation

The land preparation lines should be approximately 1,200 meters but this length can vary once the harvest is planned. The implement is lifted every 400 meters approximately, in order to generate access roads that are four meters wide and protect stands against erosion.

As part of the land preparation, after the scond pass and almost immediately before planting, glyphosage herbicide is applied over 100% of the area. The herbicide emilinates existing vegetation which allows eliminates competition of the seedling for light, water and nutrients from weeds for a greatest possible period of time. All herbicide application is done in the most suitable conditions such as low wind and dry environment to the extent possible. If necessary, we would apply a brand adjuvant *Cosmoflux* commercial in maximum 40% of the plantation area, in a dosage between 1.5 - 2.5 cm3 / lt.

The operator who performs the herbicide application is properly trained, knows the product, its handling, its storage and the final disposal of the packages. The decision to carry out weed control is made based on the schedule of activities and the subsequent weed characterization in the field. We decide the dose of the products and/or additives to apply according to the type of weed, predominant species and development status.

2.3.6 Plantation establishment

Either manual or mechanical planting must ensure that the seedling is placed securely in the good tilth of the row that has been prepared. Planting must comply with the following criteria:

- Be placed vertically
- Just the root plug must be in the soil
- The root plug must not be bent or squashed at all

Mechanized plantation will be carried out by a tractor with a planted machine mounted and calibrated. At the time of planting it also fertilizes the seedling. The seedling will be planted at two to four centimeter deep and 2.3 meters from the next seedling. The seedling will be rustified and adequately tall depending on the species and the month in which it is to be planted. This planting machine has a dosing system of gel retainer by pressurized tank, thus allowing to extend the planting range into the months of least rainfall. The spacing between plants is previously calibrated as is the dose of fertilizer per individual. Depending on the climate, the dose of fertilizer of the first and second fertilization may vary, without affecting the total fertilizer used in tree life.

Fertilizing at Planting

The fertilizing of eucalypts at planting has resulted in very meaningful and profitable growth responses. The principle behind fertilizing is to provide the seedling with an early boost. Research has shown that this is best achieved through the application of approximately 60 grams of each of the macro elements nitrogen (N), phosphate (P) and potassium (K) per tree plus other essential trace elements. This application is best when split into two applications. The first application is higher in P which enhances rapid root development and therefore enables the seedling to optimize the uptake of the other essential nutrients and moisture from the cultivated site. The response to the application of P is improved by the simultaneous application of nitrogen (N) and potassium (K). N seems more important on soils low in organic matter (< 2% organic carbon), while K is particularly beneficial on soils with higher organic carbon levels. Responses to the application of fertilizers have only been shown to be beneficial where it is done in conjunction with other silvicultural operations. These include the appropriate land preparation, weed control and planting of healthy, vigorous seedlings. Seedlings with moribund root systems are incapable of responding meaningfully to fertilizing at planting. Recent research has also shown the importance of key trace elements which if in short supply will have a detrimental effect on growth. These include boron, magnesium and zinc.

2.3.7 Controls

2.3.7.1 Weed Control

The objective is to maintain an area around the seedling of at minimum 1 meter in diameter free of weeds for the first three months. Herbicides are applied before the establishment of the plantation (3-7 days). Between the "streets" of the plantation, herbicide is applied mechanically, according to the growth in the sites, with the maximum when the weeds are 30 cm high. It is also applied manually according to established schedules and the need of the site. Glyphosate is applied, and the corresponding personal protection elements are used and environmental considerations are complied with.

Figure 7. weed control

Preplant weed control

The ideal situation in which to do the planting is following a preplant application of herbicide. This allows for the total area to be sprayed with a boom sprayer which is very economical. The planting must take place within 3 – 7 days of the application having taken place to ensure that the trees are able to fully capitalize on the full period of the weed control, usually a period of between 8 – 12 weeks.

Inter-row and line-clean weed control

These activities take place independently and as required. In both activities the boom and nozzles are covered to ensure that the herbicide does not drift onto the tree canopy. Interrow control is done mechanically and it is critical that the boom spans the full width of the interrow to ensure that no weed “fringe” remains as a source for further competition and the need for an additional spray.

2.3.7.2 Pruning

For acacia, a corrective pruning is performed when it reaches an age of 7-8 months and up to 65% of its adult height. The branches are cut flush with the shaft without damaging the bark of the tree, preferably in the dry season of the year. If the latter is not possible, healing should be applied to avoid attacks by microorganisms. Use cutting tools such as scissors or saws, depending on the diameter of the branch.

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Figure 8. Pruning

2.3.7.3 Prevention and mitigation of forest fires

We have a Fire Protection Plan for our operations, which is a guide that is part of our forest management system and which also has a fire risk meter. Additionally, a global satellite based fire monitoring system is used for fire control, prevention and management. We use AFIS: Advanced Fire Information System, that provides almost real time information on fire risk using MODIS and MS Data. This system is part of the FAO global fire information management system.

We have two levels of activities in our Fire Protection Plan:

- The prevention of man-made fires through education of the population, specific legislation and corrective measures.
- Controlling the combustible material to prevent or hinder the spread of fires that may not be avoided.

2.3.7.4 Control and management of pests and diseases

Phytosanitary control

During the first month after planting, monitoring and control activities are carried out in the stands in order to identify and quantify species of insects, fungi and pathogens in general. Together with the growth and monitoring inventories, they will carry out a phytosanitary evaluation in 1-3-7 years to continue identifying and quantifying pathogens that can reach the threshold of economic damage (mortality greater than 5%). We are aware of pest

reported by ICA and are building a data base with insects found in our plantations.. So far none has represented a problem in our existing forestry plantations.

Ant control

The arriera ant is the main plague that threatens our plantations. Our objective is to detect the presence of ants in a timely manner before the ants can have a negative effect on our forest plantations. We identify, quantify, and categorize the anthills based on their size following an internally established procedure for quantification and categorization. The management and control of the arriera ant, has several complementary components. Their effectiveness depends on the genus and species of the ant. The *Atta spp*. and *Acromyrmex spp*. ant are the most present in Colombia.

2.3.8 Harvest

Our harvesting system is ideally suited to the flat terrain, soils and weather conditions in Meta and Vichada, Colombia and is manufactured by Matriarch, Bell Equipment in South Africa. The two main pieces of equipment are a fastfell, which fells and bunches trees, and a skogger which extracts, cross cuts and stacks trees at road side. These machines have been ergonomically designed and comply with all international safety standards. We sent instructors to be trained and developed as machine operators at the Matriarch/Bell Equipment manufacturing plant in South Africa to gain a deep understanding of the machine and its mechanical and operational capabilities. Those instructors in turn trained local employees to become competent operators.

Figure 9. Harvesting

One of the key advantages of these machines is that they are very light thereby reducing soil compaction and they can operate in dry and wet conditions.

2.3.9 Transport and logistics

The state of Vichada has the lowest population density in Colombia and one of the lowest population densities in the world. As a result, there is little traffic on the roads and basic road infrastructure is bad. We plan on building roads to connect plantation areas and to acquire Bell Equipment long-haul vehicles that have a high pay load capacity to optimize costs. Roads will be built with a locally available material known as ripio which makes the cost of road construction efficient. We have estimated a cost of 190$/ha for road construction at a density of 46 ha/km. We will be the first company to introduce this transport system in Colombia delivering technology transfer into the local forestry sector. We will transfer this activity to third party contractors after the first three years as there is plenty of trucking experience in the country making this an attractive area to create entrepreneurial opportunities for the local communities and people.

Logistic overview

We chose our location based on the access to two major river systems: the Meta and the Orinoco Rivers. This location provides access to both the domestic market via the Meta river upriver towards Puerto Gaitan, and to the international market via of the Meta downriver and the Orinoco downriver. River transport is the most cost-effective form of transportation. We intend to develop the commercial navigability of the Meta river and add wood products to the bauxite barge river traffic on the Orinoco river. The Meta river empties into the Orinoco river. The Meta river is smaller than the Orinoco, which is the third largest river in the world in terms of water discharge, requiring a different configuration of barges in each river. The total distance of the Meta river is 804 kms and on average it is about 800m wide, with an average discharge of 6,496 m^3/sec and mid current flow speed of 2.7 knots at medium river level. International market wood chips will travel 180 kms on the Meta to the confluence with the Orinoco river.

Figure 10. Logistic overview

The total distance of the Orinoco is 2,140 km and it is 5 km wide in places. The medium flow on the Orinoco river is 36,000 m³/sec. At peak flow the Orinoco has been measured at 90,000 m³/sec. From the confluence of the Meta and Orinoco, international market woodchips will travel 756 kms.

We have conducted bathymetry surveys on both the Meta and Orinoco rivers. Bathymetry is a study of the depth and bed profile of a water body. This information is formed by a series of sonar 'pings' to the riverbed at the rate of 15 'pings' per second, which is translated into riverbed contours indicating rocks, obstacles and banks under the water surface. We continue to collect bathymetry, rainfall and water level data.

Wood chipping processing facility

- The log pile will be supplied from both barge and truck transportation.
- The facility will have two port sites, one for logs and one for woodchips.
- A research and development facility will also be located at this property.
- A direct conveyor will load barges on the river

Transportation Logistics

- We will be contracting the barging operations to an experienced operator, who at sustainable volumes will be transporting 2.5 million tons a year.
- Barges will be aggregated at the Orinoco river in order to increase convoy size and optimize convoy capacity and cost.

- Estimated operational costs have been developed in conjunction with existing operators on both rivers.

2.3.10 The Colombian Domestic Market

Colombia has the second largest population in South America, and an increasing GDP per capita – both these factors drive market demand for wood products. The Food & Agriculture Organization's (FAO) most recent annual data (2015) show that the consumption of wood in Colombia exceeded 18 million cubic meters of roundwood. The FAO estimates do not include wood fiber for biomass electricity generation or imports of finished wood products. Domestic plantation forestry supplies approximately 20% of consumption, with the remainder attributable to imports, wood scavenging and illegal harvesting. Colombia is dependent on imports to meet its wood fiber needs and imports are increasing for both wood-based products and materials, including pulp. In addition to market growth from population increase, the data from other countries show that per capita wood consumption grows as GDP per capita increases. That indicates there is significant market growth expected as both the population and economic wellbeing of Colombia increase concurrently. Using a modest average growth rate of 3% per annum going forward from 2015, we can extrapolate that the input volume required to feed the primary and secondary markets by 2030 will be in the order of 28 million cubic meters per annum. Data from other Latin American countries suggest that an increase in domestic production will stimulate additional demand. In some industries, such as construction, more expensive materials such as concrete and steel are substituted for wood products due to the shortage of sustainable wood products in Colombia. This means there is also additional market room in those sectors beyond what is assumed by FFC.

Construction Materials Plant

Colombia has few sustainable domestic sources for treated lumber and structural wood products. The treatment processes currently available domestically are often surface applied, not pressure-treated, so of a sub-standard quality. As a result, much of this material is imported or substituted with more expensive and less sustainable commodities like metal or concrete. In the worst case, timber is obtained through the illegal harvesting of indigenous forests.

Without a reliable domestic supply of wood, the secondary and finished wood products sectors are also stunted and have to rely on imports. FFC will establish a processing plant for pressure-treated construction materials in late 2020. Initially FFC will produce and treat sawnwood, finger-jointed structural wood, and poles for fencing. Further developments will include electrical utility poles, and wood-based panels.

Key Considerations:

- As we increase supply, we expect to see an increase in the secondary and finished goods sectors further driving internal demand for fiber.
- Data shows that increasing GDP correlates with increased demand.
- There is only one large competitor in the sawnwood sector Industrias Forestales Doña Maria/Nucleos de Madera.
- Residual fiber from the processing offcuts will be cycled into the chip supply for bioenergy or pulp use.

Wood-based Panel Production Plant

Colombia imports the majority of its finished wood products including wood-based panels, furniture, construction materials and paper products. With a growing population and an emerging middle class, consumption of panel products such as furniture, building materials and flooring is increasing significantly.

We will enter the wood panel market at a volume that is less than 25% of the amount currently being imported.

Key Considerations:

- Import market is consolidated – a potential entry partnership.
- Tablemac and Primadera are the main domestic producers.

Pulp and Paper Mill – Sappi

By 2028, we expect to have sufficient fiber to deliver to a mill located in Vichada. Sappi is looking to retain its leading global market share of 35% in dissolving wood pulp markets.

Sappi by the numbers:

- Manufacturing operations on three continents.
- 516,000 ha of plantation forests in South Africa.
- Paper pulp production of 2.3 million tons a year.
- World's largest manufacturer of dissolving wood pulp with production capacity of 1.4 million tons a year.
- 2018 total sales of $5.8 billion.
- Almost 12,500 employees worldwide with sales in over 150 countries.

International Markets Woodchips

The fight for fiber prices is projected to rise as global wood biomass demand increases and supply challenges continue

- Power plants with capacities above 50 MW are expected to increase their demand by ~10% by 2020. Additional pressures will come from power plants with capacities below 50 MW.
    - Biomass power plants are shifting away from pellets and into woodchips.
    - Limited local supply results and looking to international markets.
- Future biomass power plants coming online throughout North
- West Europe will amount to ~1,400 MW and will mostly be fueled by woodchips.
    - Asia wood pellet demand is expected to increase from 5.4 million tons in 2017 to over 19 million tons by mid-2020s.
- Pacific markets' demand for pulp and paper is expected to increase by 13% in the short-term (~84% will be for hardwood chips).
- Woodchip supply shortfall in Asia is expected to be 3.5 million BMDT (7 million GMT) by 2023.
- The market is witnessing higher prices:
    - 15% price increases of in biomass and pulp and paper (IBB Brokers).
    - Upwards pressure (~20%) in contract prices renewals (TWK)
    - Soft woodchip prices ~25% higher in the first half of 2018 (US/Australia into Japan).

- World pulp demand increases are evidenced by new plants (or expansions) in Uruguay, Indonesia, Chile and South Africa.

    - Mondi and Sappi expansions require additional 1.3 million tons of fiber by 2023.
    - UPM Uruguay requires 6 million tons by 2021.
    - Pricing differential between pulp and biomass is narrowing and following an upwards trend. It is a sellers' market.
- Weather, pests, and government policies are putting pressures on the market and adding to a supply/demand imbalance.
- New certification and environmental requirements are limiting available supply.
    - European requirements for SBP.
    - Global need for FSC or PEFC.

FFC has entered into letters of intent with or received expressions of interest from offtakers totaling 1.2 million tons – more than 5-times initial harvest volumes.

FFC intends only to export wood chips, but our facilities are designed to also accommodate the export of logs if future demand warrants.

- Initial woodchip shipments will be for bioenergy with a small shipment in 2020, increasing steadily to 1.2 million tons/yr at steady state.
    - FFC has letters of intent for offtake with the European biomass utilities listed on this page for over 1.15 million tons.
- In 2026 we add wood chips for pulp into the international market. These chips are highly suitable for paper products and wood panels.
    - The initial volume will be 300,000 tons/yr, increasing to 450,000 tons/yr at steady state.
- Processing for both bioenergy and pulp chips will use the same mill equipment logs providing fiber destined for the pulp market will be debarked before being chipped.

2.3.11 Routes to market

Figure 11. Access to domestic and international markets

Commercial Strategy

- FFC's wood fiber can be used for pulp & paper, biomass, fiber board, utility poles, construction, and others.
- Access via Orinoco River to international markets and via Meta River to domestic markets through low cost barging.
- Maximize sales price while looking for certain medium- and long-term contracts to reduce risk.
- Currently negotiating multi-year offtake agreements with several European investment grade utility and pulp & paper companies.
- Initially we expect most of our production to go to the international market, with the long-term projection showing a balance between international markets, domestic markets, and domestically fed processing for international sales (pulp).
- Maintain optionality to move up the forestry products value chain with appropriate strategic partner.

Access to domestic and international markets

- FFC is a low-cost producer of wood in part due to the short lead distances between forest to mill.

- FFC intends to access the biggest markets in Colombia, mainly situated in Bogotá, Cali and Medellin.
- Lead distances for finished goods are similar to those found in Brazil, South Africa and other leading fiber processors.
- The domestic markets will be accessed by a combination of river transport for two-thirds of the year, the most cost-effective means of transport, and trucking for the remainder providing continual access to any city in Colombia.
- FFC is strategically located in the north-eastern part of Vichada with river transport access to both the Meta and Orinoco Rivers.
- Wood chips will be sent to international markets via river barge and then by transoceanic ships.
- Finished wood products (once mills are established) will be sent from FFC's western district to the major cities of Colombia via barge and road transport.

2.3.12 Forestry Management Information System

We aim to ensure access and application of global forestry management expertise and access to world class forestry management information. In order to achieve this, a forest management information system (FMIS) Microforest provides access to specialist information providing forestry support systems to ensure that all levels of management are able to quantify their decisions on reliable data based on strategic long term fiber resource plans (LTFRP) covering 10 - 20 years, tactical plans (3 – 5 years) through to annual plan of operations (APO) with monthly and daily productivity and financial controls.

The propriety management information program, Microforest, which is now available in a Spanish version, has been specifically developed for the forestry industry. It is an integrated plantation and natural resource management system that encompasses the entire life cycle of forestry operations and includes modules that manage inventory, modelling, planning, scheduling, operations and logistics (budgets). In addition, a spatial Geographic Information System (GIS) is linked as part of the integrated system, so as to provide the user with all the necessary attribute data in a map format, thus allowing for effective and efficient planning and control.
Microforest comprises two modules, the first being the Plantation Manager module, and the second is the Business Suite module. The different components are as follows:

Plantation Manager (PMi)

- Compartments, Inventory, Open areas, Operations Map viewing using GIS
- Growth modelling
- Harvest scheduling
- Strategic and Tactical planning

Business Suite (BSi)

- Operational planning (Annual Plan of Operations [APO])
- Logistics
    - Recording of production, stock control, production (harvesting/transport) and sales
- Financials
    - Budgeting, capture and validation, cost of sales (own or contractor),
    - integration with accounting system (dependent on the accounting package)

The Plantation Manager will allow management of all forestry related issues pertaining to the compartment. From this data set, the requirements for the long-term fiber resource (strategic) plan (LTFRP) and the different tactical plans can be developed. The second module which interfaces directly into the Plantation Manager is the Business Suite, providing the operational plan (APO), which allows day to day management controls associated with the different activities and the financial controls and reporting linked to the budget plan. The package is web based and the architecture has provided a robust platform. The solution will be implemented in a multi-tiered architecture, utilising Microsoft .NET and Smart Client technology. This approach is both practical and cost effective for deploying the solution in widespread and remote locations. Microforest works well even in environments where sites have to communicate with a server over a slow WAN, dial-up connection or even GPRS offered by cellular networks.

3. STATUS OF THE PROJECT

3.1 Planted areas

Between 2010 and 2020, 11384,83 hectares have been planted, with a planting density of 1,333 trees per hectare. Next table shows the distribution of the area planted per year by species.

Table . Distribution of planted area for 2010-2020

YEAR	EUCALYPTUS	ACACIA	TOTAL
2010		8,89	8,89
2011		472,76	472,76
2012	4,26	290,15	294,41
2013	137,00	390,70	527,70
2014	1244,11	1260,28	2504,60
2015	8,96	69,90	78,86
2016	112,49	168,05	280,54
2017	2360,81	885,98	3246,79
2018	1335,39	676,02	2011,41
2019	1531,30	295,81	1827,11
2020	22,49	109,27	131,76

3.2 Complementary works

The project requires required complementary structures and infrastructure:
We have a camp located at San Cristóbal, where the main field activities of the project are located and accommodation for staff that works in the field, in addition to support staff in the following places:

Table Number of people per camp/base

Camp	Property	No. of people	Activity
San Cristóbal	San Cristóbal	100	Main field activities of the project: camp, nursery, application of herbicide and fertilization, firewalls, controlled burning and fire fightings.
Paraíso PC	Paraíso PC (Puerto Carreño)	50	Camp, fertilization and herbicide application, firewall, controlled burning and fire fighting.
Malvinas	Malvinas	10	Ranger (the future of this location is the location of a loading terminal) firewalls, controlled burning and fire fighting, fertilization and herbicide application.

Tierradentro	Tierradentro 6	60	Camp, fertilization and herbicide application. firewall, controlled burning and fire fighting.
Toro I	Toro I	20	Camp, firewall, controlled burning and fire fighting. Herbicide application and fertilization.

These six bases contain basic infrastructure (bedrooms, bathrooms and kitchen). The function of these bases is to serve as support to the field work, the surveillance of both the properties and the plantations and the accommodation at project staff.

3.3 DISTRICTS

We acquired land rights of 39 farms located in Puerto Carreño and La Primavera municipalities (Vichada, Colombia) which sum approximately 38.318 ha. The location of the plantation areas is illustrated on the map below and extend from Puerto Carreño in the east to the town of La Venturosa in the west. Geographically the project is divided in three districts.

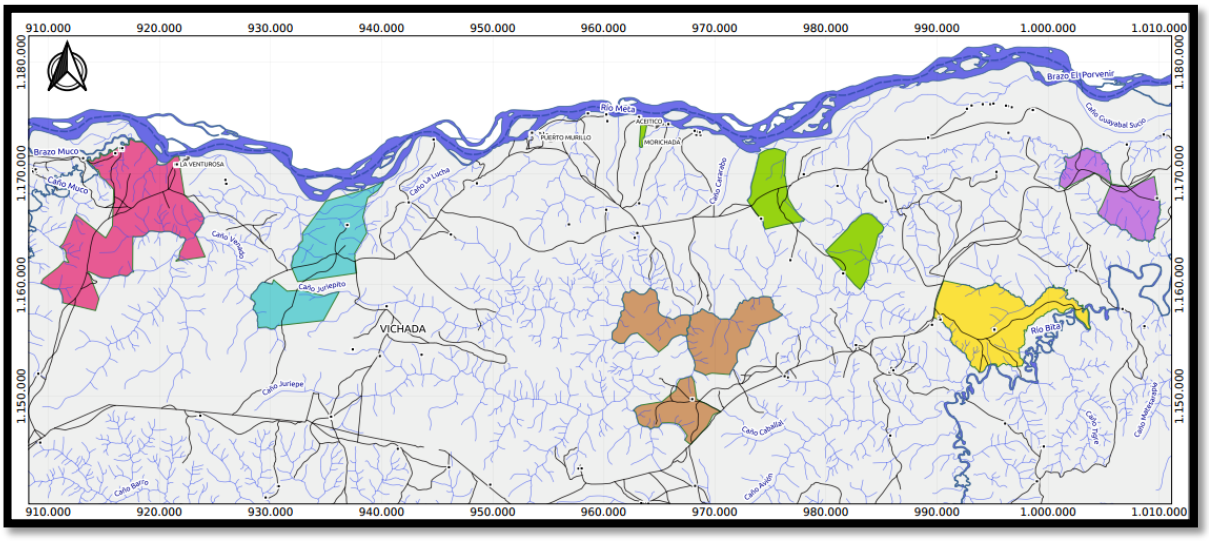

Figure 12. Location

Figure 12 shows the location of the lands acquired until now and the next table shows the names and the areas:

Name	Area (ha)
La cordobeza	1255,02
Garza Morena	1293,69
Paraiso	1144,29
Tierradentro	2233,7

Name	Area (ha)
Toro 2	303
Toro 2-1	303
Toro 2-2	302,99
Toro 2-4	302,97

Name	Area (ha)
Tierradentro 2	294,54
El Paraiso tierradentro	1483,3
Tierradentro 5	211,11
Tierradentro 6	436,58
Carraito	728,33
Cuatro Amigos	777,28
El barajuste	1217,34
El Comienzo	1158,77
La fe	1003,94
La Fortaleza	899,97
La orqueta	1298,78
La Victoria	441,78
La Delicia	1583,01
El triunfo	1134,52
Las Malvinas	110,71
Toro 3	1529,5
Toro FMS	2145,21

Name	Area (ha)
Toro 2-5	303
Toro 2-6	302,99
Toro 2-7	303,47
Toro 3-1	301,02
Cuernavaca	963,48
La Josa	1075,75
Llano Lindo	1075,23
Los Palmares	1296,58
Paraiso I	1412,25
Paraiso II	1764,21
Puerto Llano Lindo	4,99
San Cristobal	1295,07
Hato Nuevo	2914,76
Paraiso Venturosa	1117,07
La Pista	1032,07
Area Total	**38318,69**

East district

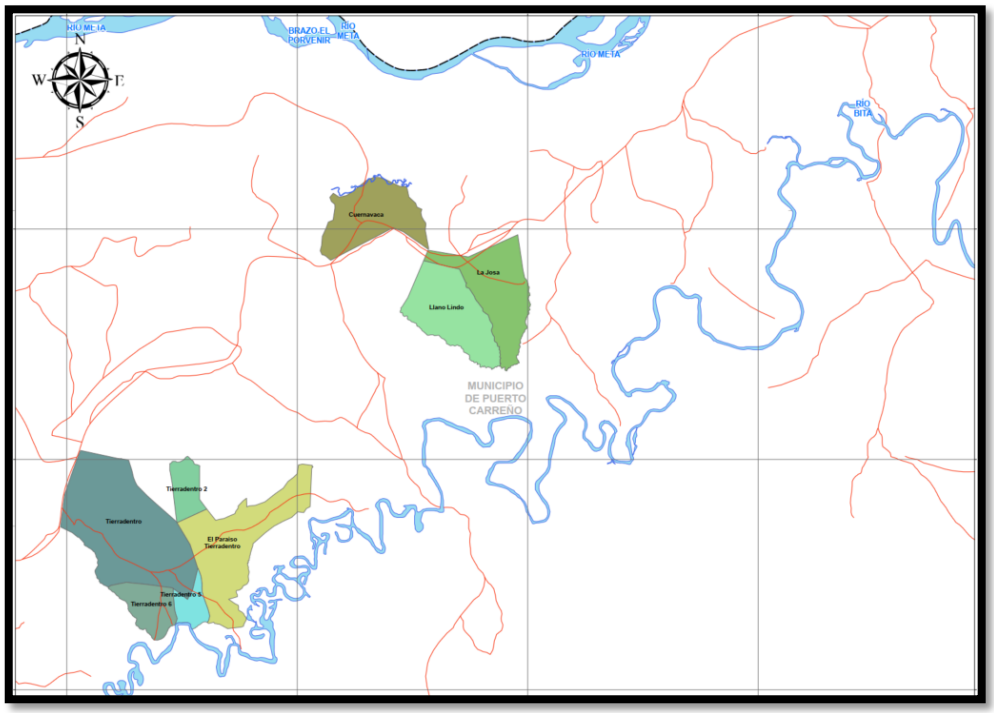

Figure 13. Rights land acquired district east

Center district

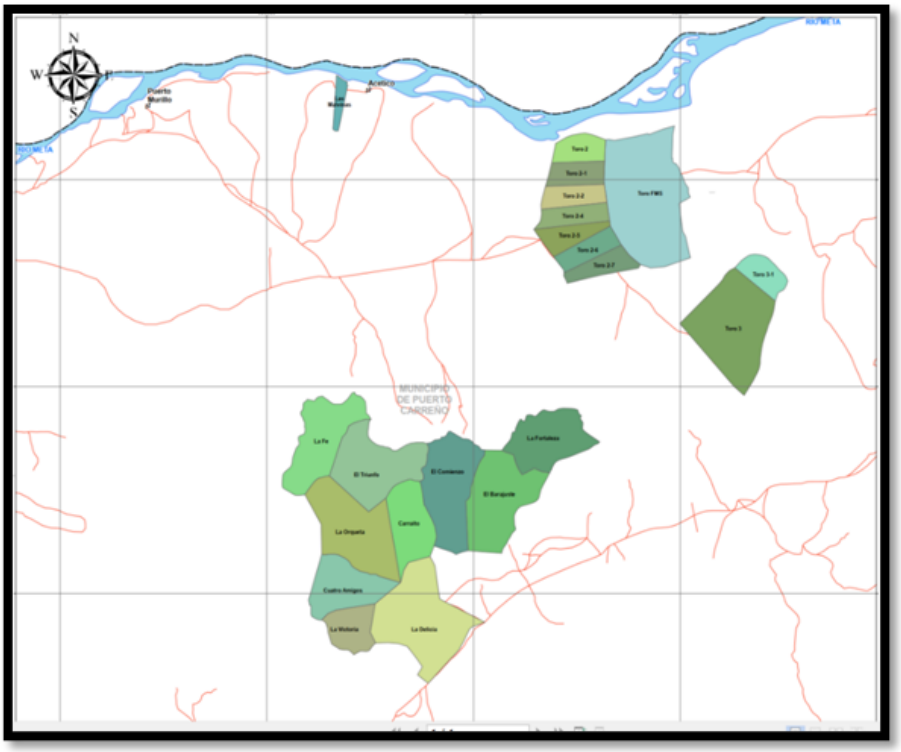

Figure 14. Rights land acquired center district

West district

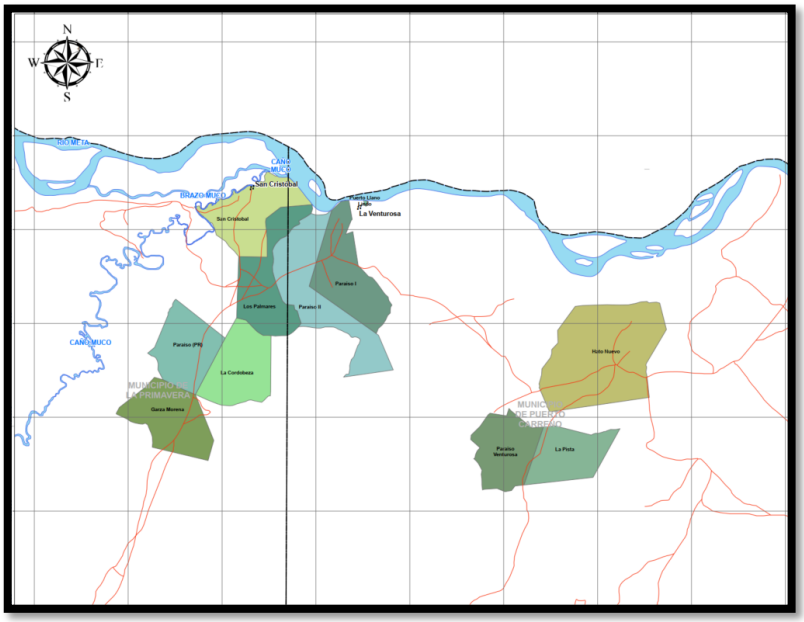

Figure 15. rights land acquired west district

3.4 Expansion project

The project expansion area is in the Puerto Carreño and La Primavera municipalities (Vichada, Colombia). Both municipalities meet the eligibility criteria for grouped projects.

We are not acquiring land rights with the following characteristics:

- Protected areas at regional and national level, like National natural parks and local natural parks. (i.e. El Tuparro Natural Park).
- Indigenous reservations legally established and reserved areas to establish indigenous reservations.
- Rio Bita Ramsar zone (according to management zoning) currently on elaboration

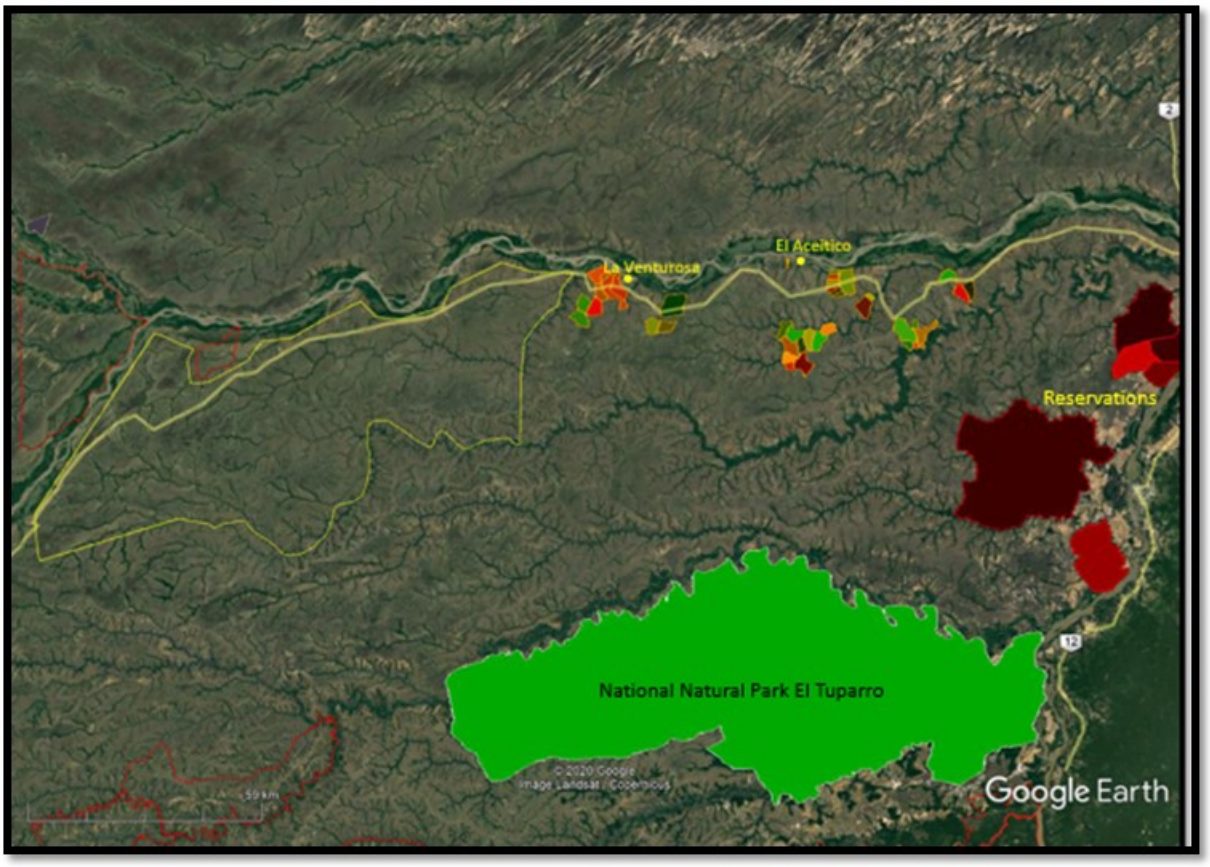

Figure 16. Expansion area and social and environmental constraints

Once completed, our expanded project area will have a standing area that is projected to reach 150,000ha by 2029. Our initial harvests will include areas planted in 2011 and 2012

incorporating several age classes. In 2029 we reach sustainable harvesting of over 5 million tons/year. Volumes increase in the near term due to an increasing MAI over 40 m3/yr resulting in improved yields. We intend to deliver fiber to both the domestic and international markets over time. Carbon sequestration is expected to reach 25mm tons by 2030.