



**Environmental Impact Assessment (EIA) for Forest First's Forestry Project in Puerto Carreño-Vichada
(Colombia)**

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1 Executive Summary

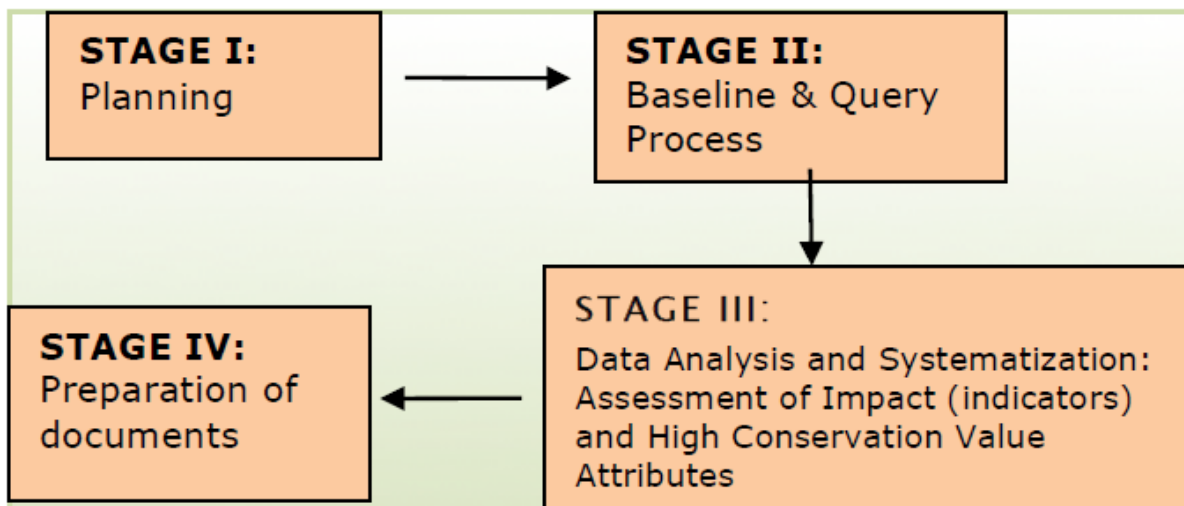
Forest First Colombia S.A.S. –FFC- has a forestry plantation project in the Colombian Department of Vichada. Forest First is interested in performing all processes and activities in accordance with Colombian legislation, as well as with social and sustainable forestry management guidelines, mainly based on Voluntary Forest Certification pursuant to the scheme submitted by the FSC (Forestry Stewardship Council), in search of forestry management that proves to be environmentally safe, socially beneficial, and economically feasible.

Forest First has hired the services of Valoración Económica Ambiental –VEA – in its capacity as an unbiased entity with renowned technical expertise, in the definition of a framework and a baseline for the project's territory, an environmental-social-economic impact assessment, and the identification of high conservation value attributes in the project's implementation area.

VEA has focused its efforts on generating an up-to-date baseline and identifying impact with its corresponding indicators and follow-up rules, as well as on assessing high conservation value attributes. To that purpose, the corresponding queries have already been submitted to experts and interest groups associated with the issues involved.

The method applied was designed into four stages for a total implementation period of seven months. Graph 1 includes a scheme of the method applied, each stage in it and its interrelations throughout the project's implementation.

Graph 1: Method Scheme



The first stage included the planning of the consulting activity (professionals responsible, trips, interest groups and schedule, among other aspects), followed by stage two, with the definition of a baseline by means of several data collection tools. The third stage consisted of the analysis and assessment of environmental, social and economic impact, and of high conservation values, starting from the baseline defined in the previous stage, and based on the different field visits made, and the various meetings held with key actors in the process.

The data obtained was subject to a triangulation scheme through the application of various tools, so as to achieve more valuable results. In turn, the work team was made up with professionals from varied disciplines (agronomy, biology, environmental management and forest engineering) aimed at an interdisciplinary process towards a close-up and ample image of reality.

Within that framework, the baseline includes characterizing the biotic, abiotic, anthropic and landscape elements in the Department of Vichada, followed by the collection of ancillary and some primary data – with a description of variables for each component referred to – on the Puerto Carreño municipality, the location planned for the project. Also, an analysis was made of the forestry sector, including the current state of forests covering all of the national territory (natural forests and plantations), in addition to certain regulatory aspects aimed at promoting the activity. The last section refers to the present situation of the forestry sector in the area on which this project is focused: the Orinoquia region.

The analysis and assessment of the impact by Forest First's forestry project in the Department of Vichada commenced with a visit to the study area in order to observe conditions and determine the base and reference point for developing the Environmental Impact Assessment (EIA) study.

A thorough research was made using available bibliography on the Department of Vichada, and more specifically the Puerto Carreño area, where several aspects were considered. It should be noted that this was a laborious process for obtaining information, given the fact that the data available is scarce and not up-to-date for the region of direct influence.

The formulation, assessment and analysis of a matrix containing environmental, social and economic effects were founded on the experience acquired by VEA and its technical team. The consideration also, of the guidelines, relative to establishment, harvesting and transportation procedures provided by Forest First, enabled the definition of framework activities whose possible effects on the different elements and variables described in Stage II were subject to an assessment study.

Following the impact matrix, a summary matrix was prepared for cross-referencing each impact assessment relative to the activity, and its classification, with the type of measures recommended. This is completed with the definition of a matrix with management standards that include the recommendations made.

Upon considering provisions contained in Colombian laws and the results obtained from the determination of a baseline and the assessment of impact (EIA) and attributes with high conservation value (HCV), an indicator matrix was defined to support follow-up and control processes, not only of possible effects of the forestry activity, but also as a result of actions in themselves, and of the elements involved.

The design applied in preparing the said matrix, was the one used in preparing the above-mentioned documents (taking into account the corresponding elements and variables) and was oriented at defining the possible indicators and parameters for measurement. If properly applied, this may be resorted to as an important source for the generation of knowledge, data feedback and the assessment of results in the gradual implementation of activities, as compared to expectations, in addition to, the possibility of applying corrective measures in deviation points identified.

As mentioned, data compilation and the definition of an updated baseline for the Puerto Carreño location were inputs for the assessment of impact, and attributes with a high conservation value. The process was continuous, intense and implied a permanent analysis, for the data available on this field was, in some cases, inexistent, and the little information found was scattered among different organizations and individuals.

Having achieved the completion of such a significant informational resource turns this document into the most detailed and developed study on the Puerto Carreño municipality, and a planning tool applicable in decision-making at both local and regional scale.

The third stage covered the identification of social, environmental and economic impact. The basis considered was a group of 25 framework activities, whose possible effects on the different elements and their variables were analyzed. Such analysis led to the identification of 130 possible impact effects that were assessed and classified according to their degree of incidence.

The results obtained showed that, from a total of 130 impact effects identified, 20.8% (27 effects) were classified as preventive, of which 85.2% (23) were deemed positive, and 14.8% (4 impact effects) were negative. It should be noted that positive effects of the impact are mostly evident in social and economic fields, for which recommendations have been made for actions oriented at preserving and strengthening such effects.

In the referred classification, 66.1% (86 impact effects) were associated to mitigation, since many of the activities involved (such as the harvesting activity) will be accompanied by the implementation of new technologies that allow for a reduced impact on certain areas.

And lastly, 13.1% (17 impact effects) were classified – pursuant to the assessment achieved – as recovery aspects. This includes activities that call for special care, such as the opening of quarries and the exploitation of sediment materials, for which more specific studies will be required, on the basis of social, environmental and economic criteria included in national laws and the FSC's guidelines in this regard. No impact was deemed for the compensation level.

Mention is made of the fact that the assessment was performed on the basis of technical ancillary information, pursuant to considerations supported on the FSC's principles and criteria, and on information supplied by Forest First. To the extent that such activities are implemented along with advances in the project, the necessary adjustments will have to be made, together with verification of the changes needed, in any case, in the assessment of effects, and the mitigation of damages caused, as well as the maximization of benefits.

The analysis made of high conservation values – upon the baseline defined, the meetings with interest groups and the field visits – determined that the project should implement actions referred to the following values:

HCV 1: Significant concentration of biodiversity values at the global, regional and national levels. Particularly in items HCV 1.2, Threatened and endangered species; HCV 1.3, Endemic species, and HCV 1.4, Critical temporary concentrations.

HCV 4: Forestry areas providing basic services of ecosystems in critical situation.

In items: Forests critical for receiving basins, Forests critical for erosion control, Forests used as firewalls.

HCV 5: Forest areas necessary for basic maintenance of local communities.

HCV 6: Forest areas critical for the traditional cultural identity of local communities.

1.1 Concise project description

1.1.1 Type of project

Forest First Colombia S.A.S. (FFC) is in the process of acquiring land rights in the Vichada region of Colombia and developing a certified, sustainable fiber supply of high-density fast-growing species which will be used both in the local and international markets for bioenergy, wood fiber and lumber.

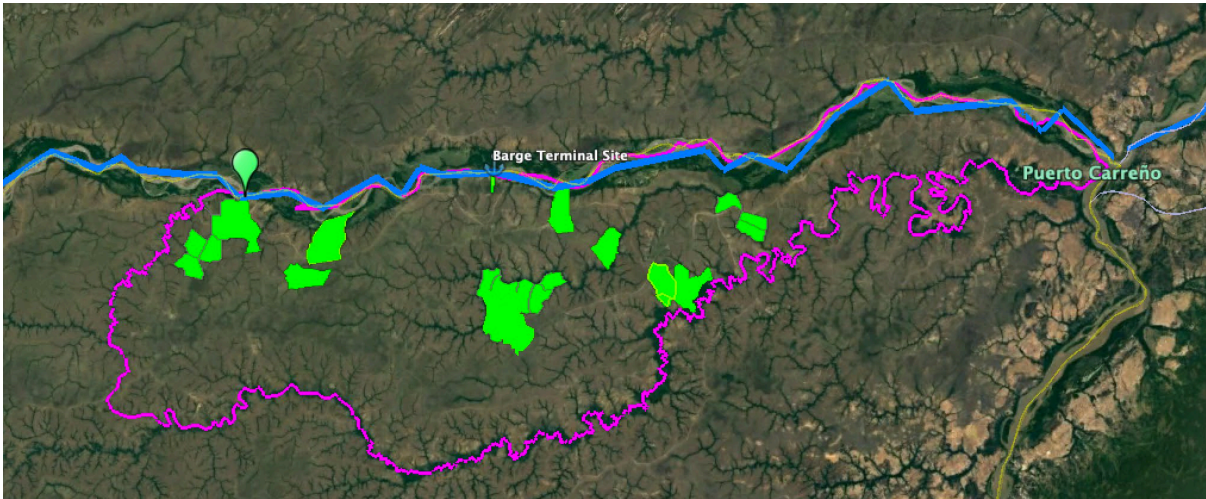
FFC is a company founded in Colombia after a thorough search of the optimal biological conditions to develop large-scale commercial plantation forests, through own plantations and forest services to third parties.

Our mission is to produce sustainable high-growth and high-performance wood, certified by the Forest Stewardship Council (FSC), offering favorable conditions for the board, bioenergy and cellulose markets, both in Colombian and international markets.

The plantations will be submitted to a certification process under the Forest Stewardship Council (FSC)'s guidelines. In addition, FFC will work to ensure that conservation areas are not part of the commercial plantation and are protected in accordance with national and international regulations for new generation forests, and also the provisions of Ruling 500.41-15-1753 of 2015 in Chapter II REGIONAL ENVIRONMENTAL CRITERIA, the restriction levels for intervention and/or minimum environmental management requirements to be considered in all phases of commercial plantation forest.

1.1.2 Location

The location of the plantation areas are illustrated on the map below and extend from Puerto Carreno in the east to the town of La Venturosa in the west. This area straddles two municipalities, namely Puerto Carreno and La Primavera.



The FFC project is located between Meta River and Bita River in Puerto Carreño and La Primavera municipalities, close to the population centers called La Venturosa, Aceitico and Puerto Murillo. The properties belonging to the project's development are listed in the table below:

Table 1.1: Properties corresponding to the FFC project

Property's name	Total area (hectares)
El Triunfo	1,123.2
Paraiso (PC)	1,108.1
Cuernavaca	963.7
El Barajuste	1,217.5
El Comienzo	1,138.3
La Cordobeza	1,255.0
Garza Morena	1,293.7
Las Victorias	435.5
La Pista	1,025.0
La Fe	999.0
La Fortaleza	893.1
San Cristobal	1,294.0
Paraiso (PR)	1,144.3
Paraiso (II)	1,764.3
Paraiso (I)	1,424.2
Los Palmares	1,294.0
Hato Nuevo	2,914.8
La Josa	805.9
Llano Lindo	859.6
Malvinas	110.7
Tierradentro	2,233.7
Tierradentro 5	211.2
Tierradentro 2	294.5
Tierradentro El Paraiso	1,483.4
Toro 2	303
Toro 2-1	303
Toro 2-2	303
Toro 2-4	303
Toro 2-5	303
Toro 2-6	303
Toro 2-7	303
Toro 3	1,530
Toro 3-1	301
La Delicia	1,577
Los 4 Amigos	742
Carraito	682
La Orqueta	1,292
Llanolindo - port	5
Total (Hectares)	35,524.3

Source: (Valoración Económica Ambiental, 2017 based on Forestal de la Orinoquia's information.

Table 1.2: Property provided with forestry services –planted 480ha

Property's name	Total area (Hectares)
Toro I FMS	2,089.50
Total	2,089.50

Source: (Valoración Económica Ambiental, 2017 based on Forestal de la Orinoquia's information.

1.1.3 Justification

FFC is a company that intends to establish commercial plantation forests in Vichada department; hence, this document contains the Environmental Management Measures to be implemented together with the request for environmental permits, licenses and authorizations for the operation of the plantations, which will be used as a planning and identification tool of environmental impacts, and a design tool of activities for the management and sustainable use of natural resources, landscape and environment. Consequently, we can comply with the terms of reference provided in the Orinoquia Regional Autonomous Corporation (CORPORINOQUIA)'s Ruling 500.41-15-1753 dated December 3, 2015.

Within its forest activities, FFC contemplates the practice of sustainable silviculture; nursery and plantations have been designed to provide the optimal conditions to produce the best results, always focused on reducing the possible impacts generated by the project.

The justification for the project can be demonstrated through the benefits that plantation forests pose in terms of the deforestation of natural resources. This can be assessed from an environmental, social and economic perspective.

1.1.3.1 Situation in Colombia

Colombia forms part of the Amazon Basin, which represents over 60% of the world's remaining rainforests¹. The 390 billion trees across the Amazon rainforest lock up massive amounts of carbon in their leaves, branches and trunks. Within the Amazon Basin, tens of millions of people depend on services afforded by the forest, broadly defined as social, economic and ecological services. In terms of FFC's operations located around Puerto Carreño and La Primavera in Vichada, Colombia, the Orinoco and Meta rivers are critical natural forest corridors in the region. This region has historically been degraded by mining activities, livestock farming and small-scale agriculture, and most of the land is currently dedicated to subsistence farming.

With over 60 million hectares of natural forests, slightly more than half of the country's land area in Colombia is considered heavily forested. Traditionally, native forests represent the main source of

¹ https://rainforests.mongabay.com/amazon/amazon_importance.htm

wood and fibre for communities and local industries². Due to low reforestation rates, the unsustainable deforestation of natural forests is a major threat to these sources of income in Colombia. Deforestation is largely the result of historical mining activities from the colonial era, with current drivers associated with subsistence economies and small holders. Rivers are the main vectors for transportation and thus assist the logistics required for logging and collection of non-timber forestry products. River corridors have thus been a target for deforestation.

Based on the current levels of deforestation in Colombia, it is important to leverage the positive offsets associated with commercial forestry plantations through their conservation programmes, increasing available forest cover in the region, increasing carbon sequestration, creating income and employment, improving nutrient cycling, and providing valuable exports to the forest sector. It is well understood that plantations can meet the growing demands for wood from a relatively small land base. Between 1990 and 2000, Colombia lost an average of 47,600 hectares of forest per year. This has increased to a total of 140,356 hectares of forest cover lost in Colombia during 2014, this equates to a 14% increase from 120,934 hectares in 2013³.

Effective measures to reduce deforestation include: (a) effective policy implementation to conserve natural forests and reduce illegal timber exports; and (b) increasing available forest products by building capacity and production. Both these measures have contributed to effective reforestation in affected countries. Colombia has enormous potential for developing commercial reforestation programs, for several reasons:

- Excellent climatic conditions for tree growth;
- 17 million hectares of land potentially suitable for commercial reforestation⁴;
- Geographically well-positioned for exporting forest products, with access along Pacific and Atlantic coasts;
- Increasingly favourable business climate, ranked 59th out of a 190 countries in terms of “Ease of doing business”⁵;
- Growing demand for timber, pulp and paper, which used to be met primarily by natural forests, but it is now recognized that a diverse supply is needed, including through the development of planted forests.

Commercial forestry in Colombia is still in its very early stages of development. In 2012 estimates indicated that only around 300,000 ha were under commercial plantations, which is strikingly low compared to some of its neighbours, such as Chile (2.3 million ha), Argentina (1.4 million ha),

² <https://www.profor.info/knowledge/commercial-reforestation-potential-colombia>

³ <http://www.ideam.gov.co/>, 2014

⁴ World Forest Investment, 2012

⁵ IFC, The World Bank, 2018

Uruguay (1 million ha) and Brazil (6.7 million ha). This situation is mainly due to decades of insecurity, which has discouraged development in rural areas and dampened investors' interests.

As progress is being made toward the consolidation of peace in Colombia, this situation is likely to improve rapidly. The development of commercial forestry is highly featured on the Government of Colombia's agenda for rural areas and is identified as one of the pillars for economic growth and employment under the National Development Plan "Prosperidad para Todos 2011-2014." The following findings are relevant:

- Forestry's total contribution to Colombia's national GDP has dropped, from 1.4% in 2005 to 1.1% in 2014.
- Consumption of wood products has increased steadily, but this has not resulted in an increase of national added value in forestry and primary processing.
- Increased demand for wood products has largely been met by imports, not Colombian industries.
- Colombia's productive commercial plantation area ranges between 340,000 and 360,000 ha.
- A dedicated institutional framework is crucial for the promotion of the commercial plantation sector.

1.1.3.2 Impact of Deforestation

The Amazon is experiencing deforestation on multiple fronts, ranging from livestock cultivation, agriculture, illegal logging, mining and infrastructure development. Drivers of deforestation vary across different regions of Colombia. They are however mainly related to increased population density resulting in pressures on access to land, clearing of land to facilitate access to transport networks like roads and rivers and changes in land use exacerbated by an increased need to feed people and stimulate alternate economic activities⁶.

1.1.3.2.1 Social Impacts

Social impacts from Amazonian deforestation are far reaching and affect the poor and vulnerable more significantly, since deforestation directly threatens their livelihoods. For people that rely on forests, deforestation related drivers is a vital source of income and the only way they can survive. Increased demand for forestry products has brought some financial benefits for poor people living in or near forests. But there is also evidence to show that usually, poor communities who are completely dependent on forests lose out to corporate interests, logging companies and migrant workers who reap most of the benefits. Many forest-dwelling communities have little control over ownership of their land. This makes them vulnerable to outsiders who try to gain access to their forest, which may cause repression and human rights violations, or exploitation. According to the

⁶ Identifying Drivers and Spatial Pattern of Deforestation in the Rio Grande Basin, Colombia, 2018 - Available at: <http://muse.jhu.edu/article/692062>

United Nations Environment Programme(UNEP), about 1.6 billion people worldwide rely on natural forests for their livelihoods.

Rainforests are also crucial to culture and society. Deforestation affects viable recreation opportunities and degrade increasingly popular destinations for recreation and eco-tourism, which hold considerable educational and scientific value. For those who live within or near them, they are a source of a deep sense of belonging, cultural heritage, and religious and spiritual significance, which are directly threatened by deforestation. In the Amazon Basin, many communities rely on forests, with deep ties to their traditional lands but without any land rights recognised by governments.

1.1.3.2.2 Economic Impacts

The impacts from deforestation are far reaching and have a negative impact on economic growth, social cohesion and the wellbeing of the natural environment. Economic impacts include loss of income and stripping the livelihoods of local communities and responsible forestry companies. Illegal logging depresses the market price of timber which acts as an incentive for other loggers to follow the same practice. This further increases the losses to taxes and duties and people and start a viscous cycle, which destabilizes prices in the market place.

It is estimated that illegal logging depresses world timber prices by between 7 and 16 percent depending on the products being produced. In the US alone, this equates to a loss of USD460 million each year. The World Bank estimates annual global market losses of USD 10 Billion and governments losing an additional USD 5 billion in lost revenue from illegal logging. The loss of climate regulation due to deforestation is expected to cost the global economy USD1 Trillion by 2070⁷.

1.1.3.2.3 Ecosystem services impacts

Deforestation impacts on ecosystem services, which broadly encompasses all essential services provided by forests as part of a natural ecosystem. These benefits broadly include increased rainfall, genetic diversity, soil stability, and a regulated climate, which are integral to the successful production of food in many parts of the world. According to the Rainforest Conservation Fund, soil stability has two main aspects. Rainforests act as a closed-loop system for nutrient recycling. Soil formation is another important and related supporting service.

Deforestation destroys tree cover and impacts on nutrient cycling allowing these soil nutrients to be lost and impacting on forest regeneration. Most rainforests are “wet deserts,” located in areas with acidic, clay-like soils that are low in nutrients and that normally cannot sustain much life. Rainforest soils are thus poorly adapted to agriculture, because once the vegetation is removed, the soil is highly vulnerable to erosion and nutrient leaching.

In terms of genetic biodiversity, forest are also a source of herbal medicine and source of pharmaceutical products globally, where more than 80% of the developing world continues to rely on traditional medicines, predominantly plants, for primary health care. In the Amazon Basin, medicinal plants serve as the main form of health care for a majority of the populace, in part because of cultural preference and also because of the

⁷ Eliasch, J. (2008). Climate Change: Financing Global Forests - the Eliasch Review. London, Earthscan

prohibitive cost of pharmaceutical products. For large numbers of rural and urban poor people in this region, medicinal plants offer the only available treatments for both minor and serious ailments⁸.

In terms of climate regulation services, the Amazon forest contributes humidity to the whole region's persistent cloud cover and forms the basis of precipitation that moves throughout the region. Further to this, rainforests continually recycle huge quantities of water, feeding the rivers, lakes and irrigation systems. Without this climate benefit, droughts would become more common in these regions. Rainforests also help regulate air quality, while locking away carbon dioxide that would otherwise contribute to global warming. According to UNEP, since 1990, the world's primary forest area has decreased by 300 million hectares, an area larger than Argentina.

⁸The Impacts of Forest Degradation on Medicinal Plant Use and Implications for Health Care in Eastern Amazonia, Elisabethsky and Wannamacher 1993

1.1.3.3 Benefits of sustainable plantation forestry in the Amazon Basin

According to the FAO, plantations produce more wood on less land than natural forests. Currently, plantation forestry accounts for 7% of total forest cover, but provides about 60% of wood used by the forest industry. New studies, supported by WWF⁹, show that FSC certification has brought about a reduction in the rates of deforestation in different tropical regions, including the Amazon Basin. Studies have found significant differences between FSC-certified and non-certified operations, with FSC certification being linked to more sustainable operations. Other studies in the region have found that certified companies had a much higher level of legal compliance and internationally recognized best practices, contributing to better working conditions and environmental safeguards.

FSC certification also emphasises effective protected ecosystem corridors and networks, as a means of ensuring that representative sanctuaries of biodiversity survive in deforestation affected area. They can also serve as reservoirs for future restoration. Expanding and strengthening protected area corridors is therefore one of the most important strategies available to mitigate the impact of deforestation.

Plantation forests help to meet the demand for forestry products like industrial roundwood, fuelwood, and pulpwood while at the same time providing some of the functions of natural forests including soil stabilization, prevention of erosion, carbon emissions mitigation, and maintaining the water cycle. Renewable sources timber is therefore an effective way for the plantation forests to play a positive part in the reduction of atmospheric carbon, resource depletion and environmental degradation. Generating a culture of timber building from sustainable plantations and thereby stimulating demand would encourage a reversal of the impact of deforestation by sequestering CO₂. For example, in Brazil, the growth of plantation forestry from 5 million ha in 2004, to 7 million ha in 2012 has contributed to the reduction of annual deforestation from 27,772 ha per annum to 4,571 ha per annum over the same period.

Plantation productivity is normally much greater than that of natural forests. The most productive native forests (those of the southeastern United States) show Mean Annual Increases (MAI) of around 4–8 percent. Plantations in Brazil (*Pinus taeda*) have achieved MAIs of 17 percent, and plantations of *Eucalyptus grandis* in Brazil have recorded MAIs of 24 percent (Cubbage et al., 2007)¹⁰. Well managed plantations in some developing countries have biomass increases in excess of 40 m³/ha/annum.

In terms of FFC's operations, it can thus be expected to have an MAI about 4 to 10 times that cited for natural Amazonian forests. Potential direct benefits from this include economic, socio-cultural and environmental benefits (Figure 1.1). Studies estimate that the global economic value of Non-timber forest products (NTFPs), from forestry to be between USD 363 and USD 814 per hectare, suggesting a global value in the region of USD 410–910 billion annually¹¹. NTFPs include useful materials and commodities obtained from forests which do not require harvesting (logging) trees, such genetic biodiversity, water purification, nutrient cycling, climate contributions, soil production and water treatment. FFC will ultimately have 150 000 ha under plantation, thus making a significant contribution to NTFP in Colombia in the range of USD 54,45 million to USD 122,1 million. FFC has also taken their first steps to becoming a FSC certified producer and to maximise on associated benefits.

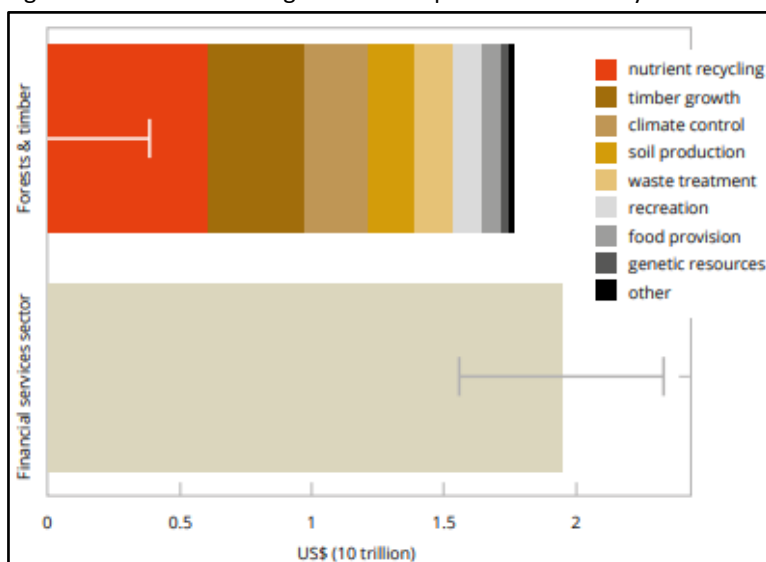
⁹ <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0129675>

¹⁰ <http://siteresources.worldbank.org/EXTFORSOUBOOK/Resources/03-FSB-Ch03.pdf>

¹¹ 100% Sustainable Timber Markets: The Economic and Business Case, WWF 2016

Figure 1.1, provides an indication of the global value of NTFP versus value derived from timber products, such as exports of sawn lumber, pulp wood etc. As it can be seen, the total NTFPs contribution equates to almost the same value contribution as primary timber production, valued at just over USD19 trillion¹¹. Globally (from natural and managed forests), nutrient cycling is the most economically important NTFP services from forests, valued at ~USD 6 trillion. Timber growth is the second most economically significant, valued collectively at ~USD 3 trillion. It can be seen that the benefits of forestry, in the form of NTFPs are quite comparable to the global value of primary timber products. There is thus a strong case to conserve forests or increase plantation forestry for the additional economic benefits they provide in the form of NTFPs.

Figure 1.1: Breakdown of global timber products and ecosystem services in USD



In terms of other financial contributions, sustainable timber markets entail timber products sourced and derived from forests with sustainable forest management practices, such as FSC certification. Sustainable forest management has the following additional benefits:

- Supply chain integrity: timber is derived from locations where on a net basis, the growth rates of commercial species in source forests exceed removal rates, that is, timber dependent industries are generating profit from forest growth rather than forest stocks.
- Biodiversity and conservation: Forests play a fundamental role in preserving biodiversity, sequestering and storing CO₂, water cycle regulation, nutrient cycling, soil stability and local climate regulation. Sustainable timber harvesting does not contribute to the degradation of these vital ecosystem services, but actively protect, manage and restore them.
- Protecting social benefits: The benefits range from meeting basic human needs for food, shelter and firewood, to improved quality of life and health. Globally, over 1.5 billion people depend on natural forests and plantations for their livelihoods³. Sustainability in this context refers to management practices which protect their rights and livelihoods.

1.1.4 Procedures, information collection, processing and analysis

The procedure for collecting and processing the information used is based on the criteria determined for the development of commercial forest projects required by the Orinoquia Regional Autonomous Corporation (Corporinoquia), which can be found in Ruling 500-41-15-1753 dated December 3, 2015.

According to the studies and the information provided by Forestal de la Orinoquia, the project was described based on the specific operational characteristics for the project.

Additionally, in order to collect the information corresponding to soils and additional information provided by the project's location, reference was made to the "General Study of Soils and Land Zoning for Vichada department", carried out in 2014 by Agustín Codazzi Geographical Institute (Instituto Geográfico Agustín Codazzi).

The main sources of baseline information are shown in the tables below:

Table 1.3: Information sources

Type	Primary Information	Remarks
Basic cartography	Agustín Codazzi Geographical Institute (IGAC) and General Maritime Directorate (DIMAR).	The defined specifications will be considered for its preparation.
Thematic cartography	IGAC, DIMAR, Colombian Geological and Mining Institute (INGEOMINAS), Regional Autonomous Corporation, IDEAM and DANE.	Cartographic adjustments from primary information and other private sources, following IGAC's protocols and satellite images available from other sources.
Geology	INGEOMINAS, Marine and Coastal Research Institute "José Benito Vives de Andrés" (INVEMAR).	IGAC and IDEAM.
Geomorphology	IDEAM	IGAC and INGEOMINAS.
Soils	IGAC, Colombian Agricultural Research Corporation (CORPOICA).	Environmental regional and local authority and territorial entities, Amazonian Scientific Research Institute (SINCHI), research center.
Hydrology	IDEAM, environmental authority, Colombian Institute for Rural Development (INCODER).	Research center (Universities, research institute).
Water use	Primary information and environmental authority.	IDEAM, INVEMAR, environmental authority.
Hydrogeology	INGEOMINAS, environmental authority.	IDEAM, INVEMAR, environmental authority.

Type	Primary Information	Remarks
Atmosphere	IDEAM, environmental authority.	Existing studies in the project's area and territorial entities.
Landscape	IGAC, environmental authority.	Territorial entities
Flora	Primary information, IGAC, research centers, National University of Colombia's Institute of Natural Science (ICN), universities, IDEMA, CORMAGDALENA, Special Administrative Unit of the National Natural Park System (UAESPNN), Colombian Civil Society's Network Association, Alexander Von Humboldt Institute, John Von Neumann Institute, SINCHI, National Herbarium, botanical gardens, regional and local environmental authorities.	Existing studies in the project's area, territorial management plan, development and river basin management plan, NGOs, specialized associations.
Fauna	Primary information, Alexander Von Humboldt Institute, Institute of Pacific Environmental Research, IGAC, research centers, National University of Colombia's Institute of Natural Science (ICN), universities, IDEAM, CORMAGDALENA, Special Administrative Unit of the National Natural Park System (UAESPNN) Colombian Civil Society's Reserve Network Association, John Von Neumann Institute, SINCHI, National Herbarium, botanical gardens, regional and local environmental authorities.	
Demographic, spatial, economic and cultural dimensions	National Administrative Department of Statistics (DANE), territorial entities and primary sources.	Existing studies in the project's area.
Cultural dimension	Primary information, Colombian Institute of Anthropology and History (ICANH), INCODER, Ministry of Culture, Ministry of the Interior and Justice.	Existing studies in the project's area, research centers, NGOs and indigenous and Afro-Colombian associations.
Archaeological aspects	Primary information, Ministry of Culture and Colombian Institute of Anthropology and History (ICANH).	Existing studies in the project's area, research centers.
Political and administrative dimensions,	Territorial entities, DANE, IGAC, primary information.	Existing studies in the project's area, research centers.

Type	Primary Information	Remarks
development trends		
Information provided by the population	Primary information	

Source: General Methodology for Environmental Studies.

The geographic information used was collected through Agustín Codazzi Geographic Institute (IGAC)'s and Orinoquia Forest Company's SIG-OT program, managed through ArcGIS program and verified in the field.

Regarding the environmental impact assessment, it was conducted based on the classification of natural resources divided in three groups: abiotic, biotic and socioeconomic. With this first classification, the assessment was carried out according to each of the project's stages and area of influence.

Finally, with the identification and assessment through the matrix, the environmental management measures included in each environmental program were formulated, and subsequently a project's risk analysis, follow-up and monitoring plan and finally a contingency plan were carried out. All these measures and programs were formulated aiming at mitigating, compensating and minimizing the negative environmental impacts that may arise due to the development of FFC project; and thus, it is ensured that the proposed measures reduce appropriately the impacts generated, with an adequate management and implementation.

1.1.5 Study's General Content

This document contains the Environmental Management Measures for the development of FFC project located between Puerto Carreño and La Primavera municipalities in Vichada department.

The company FFC will develop the project, which will consist of areas for one nursery, dormitories, bathrooms, one kitchen, one dining room, one warehouse to store tools, supplies and waste, elevated tanks, and the adaptation of the internal access roads for the plantations' activities and the project's development.

The content of the technical study includes **Chapter 1** which provides an Executive Summary and discusses the type of project, location, justification, procedures, information collection, processing and analysis, objectives, background information, scope, methodology used for the environmental

study's development. **Chapter 2** provides an overview of the Policy, Legal and Administrative Framework.

Chapter 3 describes the project and Chapter 4 provides an overview of alternatives considered for the project. The Baseline conditions of the area potentially affected by the project are provided in **Chapter 5**.

In **Chapter 6**, the Environmental Assessment is carried out through the assessment matrix of the environmental impacts generated by the project's development. These possible impacts were assessed by an assessment matrix, taking into account the assessment criteria determined in Corporinoquia's terms of reference: Nature of the Effect, Type of Impact, Intensity, Possibility of Occurrence, Duration, Trend, Extent, Area of Influence, Reversibility and Mitigation. In **Chapter 7**, proposed environmental prevention and mitigation measures are provided, while **Chapter 8** assesses environmental impacts identified for the project following the application of appropriate environmental prevention and mitigation measures.

Chapter 9 formulates the Environmental Management Plan with its respective management sheets for each component, in order to prevent, mitigate and correct potential impacts and thus adopt them in the project's activities. This management plan enables to formulate a project's follow-up and monitoring plan. Finally, based on the risk analysis, a contingency plan is formulated, which determines preventive and control measures for all the project's activities.

1.2 Objectives

To prepare a Technical Study - Environmental Management Measures in order to develop the FFC project according to the Terms of Reference provided in Ruling 500.41-15-1753 dated December 3, 2015, to establish and manage commercial forest projects in Corporinoquia's jurisdiction.

1.2.1 Specific Objectives

- To describe generally the forest project's activities to be developed in Puerto Carreño and La Primavera municipalities of Vichada department
- To characterize the project's baseline of the area of influence in terms of abiotic, biotic and socioeconomic environments and landscape
- To analyze the demand and the use, exploitation and/or impact of Natural Resources related to the forest project's development
- To carry out an Environmental Assessment for the FFC project's direct area of influence
- To carry out a Risk Analysis for the FFC project

- To design the Environmental Management Plan for the FFC project
- To prepare the FFC project's follow-up and monitoring plan.
- To design the Contingency Plan.

1.3 Methodology

The methodology to collect and process the information is based on the criteria determined for the development of commercial forest projects required by Orinoquia Regional Autonomous Corporation (Corporinoquia), which are found in Ruling 500-41-15-1753 dated December 3, 2015.

The following table includes the description of the activities for the preparation of the technical study, environmental management measures.

Table 1.4: Description of the project's activities

Stage		Objective	Activity
I	Revision and analysis of secondary information	Information collection of the project's activities	Company's document review and meetings with the company's work team
		Information about the study's environmental and social characteristics of the area	Document search, research and studies in the project's area
		Information about environmental issues of La Primavera and Puerto Carreño municipalities' Territorial Planning: weather, air quality, noise	Information search and review regarding the municipalities involved in the project's area
II	Planning of field activities	Information analysis and development of environmental baseline	Secondary information verification based on the visual interpretation of satellite images
			Field work to collect information about abiotic, biotic and socioeconomic environment
			Information collection in the field and its analysis
		Characterization of natural resources	Sample-taking and characterization of natural resources, to request permits and baseline information
III	Information analysis	To systematize and document the information collected in the field	Preparation and description of the environmental baseline for biotic, abiotic and socioeconomic environments

Stage		Objective	Activity
IV	Preparation documents of	Identification and environmental assessment	Identification and assessment of environmental aspects and impacts
		Risk analysis	To determine risk and environmentally sensible areas
		Formulation of the environmental management plan	The strategies, plans, programs and projects are designed and formulated, meetings with the company's work team
		Design of the follow-up and monitoring plan	
		Design of the contingency plan	

Source: (Valoración Económica Ambiental, 2017)

1.4 Identification of project sponsors, operators and contractors

1.4.1 Project Sponsors

Forest First Colombia (FFC) is a Colombian forestry company that has developed a distinctive and valuable, win-win, triple bottom line investment model that has positive commercial, social and environmental benefits while delivering a acceptable return on investment to its shareholders. FFC holds as one of its most important tenets: economic, environmental and social sustainability. As a forestry company working exclusively in Colombia, a sincere and concerted commitment and sense of responsibility for the impact of its business on neighbors and the environment has driven an innovative orientation toward forestry operations and a holistic set of indicators to track and monitor overall business success. The symbiotic relationship between FFC's success and the uplifting and protection of the environment is one that has been consciously woven into the fabric of the company. Stimulating both local and regional economic development and protecting the environment is part of FFC's long-term, proactive form of risk mitigation. Communicating these values assists FFC in attracting financing from institutions and individuals with a similar ethos.

During the initial five years of operations FFC was sponsored with capital from its founders, private investors that found affinity with the asset class, the country or both until 2016 when SAPPI Ltd invested as a strategic investor. In 2017 FinnFund became an equity investor in Forest First Colombia.

1.4.2 Project Operations

FFC holds

1.4.3 Contractors

As part of our Social inclusion ethos we have decided to create entrepreneurial opportunities for those interested in taking them in our immediate communities and within Colombia. For that reason, from inception we have been working with local contractors for our Silviculture, nursery, and recently in our wood transport operations. We have also created opportunities within our location management with catering, construction and logistics third parties.

To date, FFC works with the following contractors:

Nombre	Actividad Realizada
COMPANIA ASESORA SILVOTECNIA SA	Silviculture
ENBOSQUE SAS	Silviculture
SILVICS SAS	Silvicultura
SERVICIOS FORESTALES DE LA ORINOQUIA	Silvicultura
FUNDACION LINDA CHARLOTTE	Catering
SERVICIOS FORESTALES DEL VICHADA SAS	Nursery team transportation
SERVIALCONT SAS	Logistics & transport
TRANSVICHADA	Seedling transport
GOMEZ MARTINEZ EDGAR JAIRO	Logistics & transport
TRANSFORESTAL VENTUROSAS SAS	Logistics & transport

1.5 Baseline environmental conditions

An overview of the Baseline environmental conditions is provided in Chapter 5

1.6 Applicable environmental standards

1.6.1 FSC Principles

The project will comply with the Forest Stewardship Council's (FSC) ten Principles for responsible forest management. These can be summarized as follows:

- Principle 1: Compliance with laws
 - "The Organization shall comply with all applicable laws, regulations and nationally- ratified international treaties, conventions and agreements."
- Principle 2: Workers Rights and Employment Conditions
 - "The Organization shall maintain or enhance the social and economic wellbeing of workers."
- Principle 3: Indigenous Peoples' Rights
 - "The Organization shall identify and uphold Indigenous Peoples' legal and customary rights of ownership, use and management of land, territories and resources affected by management activities."
- Principle 4: Community Relations
 - "The Organization shall contribute to maintaining or enhancing the social and economic wellbeing of local communities."
- Principle 5: Benefits from the Forest
 - "The Organization shall efficiently manage the range of multiple products and services of the Management Unit to maintain or enhance long term economic viability and the range of environmental and social benefits."
- Principle 6: Environmental Values and Impacts
 - "The Organization shall maintain, conserve and/or restore ecosystem services and environmental values of the Management Unit, and shall avoid, repair or mitigate negative environmental impacts."
- Principle 7: Management Planning
 - "The Organization shall have a management plan consistent with its policies and objectives and proportionate to scale, intensity and risks of its management activities. The management plan shall be implemented and kept up to date based on monitoring information in order to promote adaptive management. The associated planning and procedural documentation shall be sufficient to guide staff, inform affected stakeholders and interested stakeholders and to justify management decisions."
- Principle 8: Monitoring and Assessment
 - "The Organization shall demonstrate that, progress towards achieving the management objectives, the impacts of management activities and the condition of the Management Unit, are monitored and evaluated proportionate to the scale, intensity and risk of management activities, in order to implement adaptive management".
- Principle 9: High Conservation Values
 - The Organization shall maintain and/or enhance the High Conservation Values in the Management Unit through applying the precautionary approach.
- Principle 10: Implementation of Management Activities
 - Management activities conducted by or for The Organization for the Management Unit shall be selected and implemented consistent with The Organization's economic, environmental and social policies and objectives and in compliance with the Principles and Criteria collectively

1.7 Proposed mitigation measures

Proposed mitigation measures have been identified and included in Chapter 7

1.8 Net environmental impacts

Net environmental impacts are assessed in Chapter 8