

ENVIROMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Pöyry Tecnologia Ltda.

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Page 1



EUCALYPTUS PLANTATION
Departments of Concepción and Amambay – Paraguay

VOLUME I – Description of Project

Content	1	INTRODUCTION
	2	LEGAL ASPECTS
	3	DESCRIPTION OF PROJECT
	4	ALTERNATIVES ANALYSIS
Annexes	I	Microplanification of San Liberato property

Distribution	
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SUMMARY

1	INTRODUCTION	5
1.1	Background.....	5
1.2	Nature of the Project	6
1.3	Project Proponent, Operators and Contractors	7
1.3.1	Project Proponent	7
1.3.2	Operators and Contractors.....	7
1.4	Project Justification.....	10
1.5	Project Schedule	11
1.6	Purpose of the ESIA	12
1.6.1	Summary of the ESIA	12
1.6.2	ESIA Methodology	14
1.6.3	Structure of the ESIA Report	14
2	LEGAL ASPECTS	15
2.1	National and Local Laws and Regulations	15
2.1.1	Principles of Environmental Law	15
2.1.2	Legal Considerations.....	17
2.1.3	Environmental Law	19
2.1.4	Forestry Law	35
2.1.5	Others	41
2.2	International Standards	44
2.2.1	Historic Background	44
2.2.2	International Treaties and Conventions	45
2.2.3	Detailed International Lender Standards.....	55
3	DESCRIPTION OF PROJECT	64
3.1	Plantation Operations and Locations	64
3.2	History and status of the acquisition of the 20 estancias	65
3.3	Nurseries	66
3.4	Plantations.....	66
3.4.1	Soils.....	66
3.4.2	Water Usage	71
3.4.3	Energy Usage	72
3.4.4	Inputs, Agrochemicals, Fertilizers and Pesticides.....	72
3.4.5	Labor Force, Worker Accommodations and Labor Structure.....	81
3.4.6	Species.....	84
3.4.7	Land Preparation	84
3.4.8	Sowing/Planting Plan	87
3.4.9	Plantation Maintenance	88
3.4.10	Agroforestry Research and Laboratories	90
3.4.11	Plantation Health Monitoring and Natural Forest Monitoring.....	90
3.4.12	Products and By-Products	90
3.4.13	Harvest	90
3.4.14	Waste Management.....	91
3.4.15	Prevention of Forest Fires	94
3.5	Sources and Volumes of Unrelated Airborne, Liquid and Solid Waste Unmitigated Discharge into the Environment.....	96
4	ALTERNATIVES ANALYSIS.....	97

FIGURE LIST

Figure 1 – Location of Forest Properties. Source: Google Earth, 2021.	64
Figure 2 – Soil classification in the direct influence zone. Source: Pöyry.....	67
Figure 3 – Land use capacity in Paraguay. Source: Project of Rationalization of Land Use (PRUT)	68
Figure 4 – PARACEL's labor structure. Source: PARACEL.	83

TABLE LIST

Table 1 – Forest Properties.....	65
Table 2 – Existing wells	71
Table 3 – Project's workforce.....	81
Table 4 – Fertilization recommendation	86
Table 5 – Main wastes.....	91
Table 6 – Identification for recyclable waste containers.....	92
Table 7 – Identification for non-recyclable waste containers	92
Table 8 – CAPEX for control and prevention of forest fires	96

1 INTRODUCTION

1.1 Background

This document is an Environmental and Social Impact Assessment (ESIA) of the forest component of the PARACEL project in line with IFC EHS Guidelines for Perennial Crop Production and what is established by the Performance Standards (PS) of the IFC, in order to form, together with the ESIA of the industrial component, the Study of Comprehensive Environmental Impact of the Project that the IFC-PS1 presupposes.

PARACEL, was established by the independent entrepreneurs Copetrol (Paraguay) and Girindus Investments (Sweden), and its industrial project is a implementation of a pulp mill with a capacity of 1,5 million tons per year of bleached pulp for paper, to be located in Concepción, Department of Concepción, Paraguay.

The forest and industrial project will use the best resources available in terms of technologies (BAT – Best Available Techniques) and environmental management (BPEM – Best Practices of Environmental Management).

It is expected that the construction phase of the mill will begin in the first half of 2021, and that its operation will take place in the first half of 2023. In its operational phase, it will be supplied with eucalyptus wood from sustainable forest plantations, that is objective of the present study. Plantations will be certified to Forest Stewardship Council (FSC) and other environment global sustainability standards such as General EHS Guidelines.

According to PARACEL, the forest project will acquire 19 estancias, or ranches for plantations, with a total area of approximately 190,000 ha, mostly located in the department of Concepción; approximately 130 km from the prospected industrial site.

Considering the overall project land area, 53% will be destined to eucalyptus plantations and 47% to protected areas. This will satisfy around 80% of the demand required for the operation of the plant and the other 20% will be provided by external producers to the company (small local producers).

During the first 6 years, a supply of wood from Brazil, Argentina and from forestations located in the country is foreseen, which will be transported by land and river to "Puerto PARACEL". It is worth mentioning that the mobilization of trucks with rolls from own plantations is estimated as of the fourth year of the project.

It is estimated that the forestry area will generate approximately 3 thousand jobs, between own contractions and outsourcing, during all the steps of the project – feasibility, construction/implementation, implementation and pre-operation, operation-learning curve and operation.

The development and content of this Environmental and Social Impact Assessment (ESIA) is in accordance with the Constitution of the Republic of Paraguay (1992), articles 4th to 8th, which determine the right to protection of human life and the to a healthy environment.

Guidelines established by Law 294/1993 and Decree 453/2013, which establish and regulate the process of environmental impact study, were also complied with, in addition to the analysis of other laws, decrees, resolutions, regulations and guidelines of the Ministry of the Environment and Sustainable Development - MADES.

In addition to the legal requirements, the ESIA was developed to be aligned with IFC Performance Standards (2012) and applicable EHS Guidelines.

The IFC Performance Standards include:

- IFC PS 1 on "Evaluation and management of environmental and social risks and impacts";
- IFC PS 2 on "Labor and working conditions";
- IFC PS 3 regarding resource efficiency and pollution prevention, including pest management activities and use of chemical pesticides evaluation;
- IFC PS 4 on "Community Health and Safety";
- IFC PS 5 on "Land Acquisition and Involuntary Resettlement";
- IFC PS 6 regarding biodiversity conservation and sustainable management of living natural resources, including the Critical Habitat concept;
- IFC PS 7 regarding the Indigenous People;
- IFC PS 8 on Cultural Heritage.

The main objective of this Environmental and Social Impact Assessment (ESIA) is to declare the environmental feasibility of the PARACEL forest component, through the characterization of the project, the knowledge and analysis of the current situation of the areas that will suffer modifications due to its implementation and operation - the designated areas of influence, for the subsequent comparative study between the current situation and the future situation.

This analysis is carried out by identifying and evaluating the possible environmental impacts resulting from implementation and the operation of PARACEL forest component. This study considers the proposal of actions to mitigate impacts, in order to minimize and/or eliminate negative changes, and increase the benefits provided by the implementation of PARACEL forest component.

1.2 Nature of the Project

The project foresees the reforestation with Eucalyptus varieties (*Eucalyptus urograndis*, *E. grandis*, *E. dunnii*, and *E. saligna*) in 114,000 ha to produce wood to supply the group pulp mill located in Concepción, Department of Concepción, Paraguay.

The project will acquire 19 estancias, or ranches for plantations, with a total area of approximately 190,000¹ ha located on a range between 30 km and 150 km from the mill site. The eucalyptus varieties that PARACEL will use require 6 years of growth prior to harvest (a 6-year "rotation").

PARACEL plans to gradually initiate planting eucalyptus on their owned plantations, but it will be six or more years before these plantations can begin to supply fiber to the mill, which is expected this will begin in 2027.

The properties are reportedly on average 47% of Quite Natural Area (i.e. non-plantable) and 53 % of Modified Area (i.e. potentially plantable). Reportedly, that mainly pasturelands will be used as plantations, and the native forest and riparian areas will be

¹ PARACEL has purchased approximately 170,000 ha of former estancias, but plans to purchase additional land to reach a total of approximately 190,000 ha.

retained and protected, which will amount to roughly 90 thousand hectares of conservation areas.

Once in full production the PARACEL owned plantations are expected to provide around 80 percent of the PARACEL mill's raw material needs, while the other 20 percent will come from local out-growers in Paraguay.

1.3 Project Proponent, Operators and Contractors

1.3.1 Project Proponent

Company name	PARACEL S.A.
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ZIP CODE	001419
Contact person	Eng. Cyro Croce Launy
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Legal Representative	Nils Grafstrom

PARACEL is a Paraguayan project that arises from the innovative vision of the Zapag family. This vision, together with the experience of the Swedish group Girindus Investments, achieves the endorsement of other Paraguayan and foreign investors to carry out the largest productive industrial undertaking and the largest private investment in the history of Paraguay.

The impulse and strength of this combination of enthusiasm, experience and capital in PARACEL, allows nowadays to consolidate the project of installing, supplying and operating a world class pulp mill, under the highest standards of environmental and social sustainability, and with the capacity to satisfy the most demanding international markets.

1.3.2 Operators and Contractors

1.3.2.1 Identification of Responsible Company by the ESIA

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1.3.2.2 Technical Personnel

The technical team prepared this Environmental and Social Impact Assessment (ESIA) to provide the necessary information to evaluate the environmental study process and define the conditions necessary for PARACEL to implement and operate in accordance with the premises of sustainability.

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Fauna leading specialist
- Engineer Lidia Pérez de Molas
Fauna Leading Specialist
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1.4 Project Justification

PARACEL pulp mill in Concepción will adopt *Kraft*² process, for pulp production. The justification for implementing the mill project is based on the premise that the current market for pulp and paper is expanding abroad. This can be seen through the projects to increase various industries in the productive sector, with the consequent expansion of their forestry bases, with South America standing out in recent years, with new pulp mills in Brazil, Uruguay and Chile.

PARACEL will use Eucalyptus wood from its land in order to satisfy 80% of the demand required for the operation of the plant; and the other 20% will be provided by external producers to the company (small local producers).

It is noteworthy that in the forestry operation of PARACEL will generate approximately 3 thousand jobs, between own contractions and outsourcing, during all the steps of the project. In addition, this activity fosters the local economy and generates tax revenues for the municipalities in the region and in the country as a whole.

Also, the environmental benefits provided by this cultivation are highlighted, such as maintaining soil with vegetation cover, preserving the legal reserve and APP and carbon sequestration, all guided by the environmental management system of PARACEL.

² *Kraft* pulp: Pulp produced by sulphate process

Considering the approach that forest management goes far beyond the simple production of products for supply to the processing chain, a comprehensive vision of the objectives of the PARACEL Forestry Project is established:

- a) To comply with the 8 IFC Performance Standards;
- b) To comply with the EHS General Guidelines of the IFC;
- c) To comply with IFC's EHS Guidelines for Forest Harvesting Operations;
- d) To comply with IFC's EHS Guidelines for Perennial Crop Production;
- e) To comply with the FSC Principles and Criteria in the long term, appropriately to the intensity and risk scale of forest management, respecting the values and policies of FSC;
- f) To manage natural forests in such a way that they are restored, maintained or improved as needed, removing the pressure of logging on them;
- g) To develop forest plantations to obtain timber resources for the purpose of supplying the pulp mill of PARACEL;
- h) To provide goods and services to local communities and the consumer, ensuring the right to forest values, ecosystem services and benefits from plantation forest management;
- i) To develop human talents, with a focus on continuous improvement of the quality of services and professional performance;
- j) To investigate and implement the best production practices with a view to mitigating negative environmental and social impacts and increasing positive ones;
- k) To adopt the precautionary approach in the identification, evaluation and implementation of management measures for attributes and areas of High Conservation Value;
- l) To maintain the processes of revision and improvement of the management plan, incorporating the concept of adaptive management under the scale, intensity and risk analysis of forestry operations.

1.5 Project Schedule

In general, the schedule of planting activities lasts approximately 7 years, starting with the acquisition of properties until the moment of harvest. Therefore, the main activities are presented below.

- Year 1
 - ✓ Land acquisition
 - ✓ Topographic survey
 - ✓ Physical register
 - ✓ Technical project (planning, roads, firebreaks, eucalyptus stands, preserved areas, effective planted area)
- Year 2
 - ✓ Land preparation (area cleaning, soil preparation, fertilization)

- ✓ Sowing/Planting
 - Year 3 to Year 7
- ✓ Plantation maintenance
 - Year 7
- ✓ Harvest

1.6 Purpose of the ESIA

The purpose of the Environmental and Social Impact Assessment (ESIA) is to evaluate the environmental and social feasibility to install the forest component of the PARACEL project in Departments of Concepción and Amambay.

1.6.1 Summary of the ESIA

1.6.1.1 Scoping

The project foresees the reforestation with Eucalyptus varieties (*Eucalyptus urograndis*, *E. grandis*, *E. dunnii*, and *E. saligna*) in 114,000 ha to produce wood to supply the pulp mill located in Concepción, Department of Concepción, Paraguay.

The project will acquire 19 estancias, or ranches for plantations, with a total area of approximately 190,000 ha located on a range between 30 km and 150 km from the mill site. The eucalyptus varieties that PARACEL will use require 6 years of growth prior to harvest (a 6-year “rotation”).

1.6.1.2 Baseline Data Collection

This report is based primarily on the Preliminary Findings Report and the Estudio de Impacto Ambiental y Social del Componente Forestal – EICF (Environment Impact from Forestry Component), but also on information from a number of other Project documents and e-mails provided by PARACEL that has been incorporated, including Forestry Director Plan by InnovaTech, the Biodiversity Baseline Study developed by CSI, The Cerrado in Paraguay and Paracel Investment, by PhD Alberto Yanosky, water quality baseline study, reports related to Paraguayan requirements for consultation with Indigenous People groups performed by Fundación Natán, the social baseline for the plantation area, and a number of other reports, studies, politics, codes from PARACEL’s project.

1.6.1.3 Stakeholder Engagement Activities

Stakeholder engagement and consultation is quite important in any project, because initiate and sustain a constructive external relationship over time. Companies that start the process early and take a long-term strategic view are, in essence, developing their local “social license to operate.”

In order to access the necessary information for social studies prior to the implementation of the project, it is of special interest to know some elements for the characterization of the area of influence and the perception regarding the project. For this purpose, PARACEL conducted interviews with key actors at the community and institutional level, such as: health, education, social organizations, productive

committees and those responsible or in charge of the establishments that will be assigned to forest plantations.

These social researches were developed sequentially, each stage began with the formation of an interdisciplinary team in charge of the survey and analysis of information obtained through secondary and primary sources. This process required the use of various data collection techniques; and, despite the complications arising from the sociopolitical context and sanitary restrictions, it was sought at all times to generate participatory spaces and direct contact with the population, especially, referents of the institutional and community environment of the areas involved in the project.

Beyond this survey carried out for the licensing process, stakeholder engagement and consultation are considered core for PARACEL activities and, therefore, a Stakeholder Management Plan was set aiming to:

- Strengthen the relationship and trust with PARACEL´s different stakeholders;
- Carry out a transparent, effective and close communication about PARACEL's values and purpose;
- Ensure the constant flow of information, creating, enabling and feeding the communication channels that allow the effective exchange of information;
- Contribute to the strengthening of the organizational culture and the pride of belonging to PARACEL from the information on achievements and impacts of the organization.

The Stakeholder Management Plan is presented in the Annex 1.5 of the Health, Safety, Environment and Social Management System Manual.

1.6.1.4 Impact Assessment

Currently, there are several methodological lines developed for environmental impact assessment: spontaneous methodologies (Ad hoc), checklists, interaction matrices, interaction networks, quantitative methodologies, simulation models, overlay maps, scenario projection, among others.

PÖYRY has a multidisciplinary team with extensive experience and has conducted numerous environmental studies in various segments, and especially in the paper and pulp sector including eucalyptus forestry. Thus, over the years, through the accumulation of experience and the increase in the repertoire of technical and scientific works, PÖYRY has developed its own methodology for the identification and evaluation of impacts.

This methodology is based on the development of a checklist (which in turn already includes interaction matrices), in which the factors generating impacts (activities) and the aspects leading to impacts on the environmental components are listed in the various project phases.

The impact assessment methodology was also based on legal provisions such as Law no. 294/93 and therefore presupposes temporal and spatial scales of impacts. In this study, the planning, implantation and operation phases were used as the temporal scales, and for the spatial scales the area directly affected, the area of direct influence and the area of indirect influence were used. The evaluation was consolidated through discussion among the members of the multidisciplinary technical team.

Thus, impacts were evaluated, qualifying them according to their specification and indicating their spatial magnitude (qualitative measure) and degree of importance depending on how long they remain in the environment.

In this methodology, the mitigation measures, in the case of negative impacts, or the strengthening of positive impacts are already predicted and related, and their degree of resolution (high, medium or low) is evaluated after implementation.

From the measurement of the impact and the resolution of the proposed measure it was possible to define the degree of importance of the impact, taking into account the environmental situation before the implementation of the company.

In the case of positive (beneficial) impacts, measures must be taken to make the most of the benefits generated; these are the so-called enhancing or compatible measures. And in the case of impacts that are partially mitigated or not possible to mitigate, compensatory measures are proposed.

Other than that, the quantitative evaluation of the impacts was carried out through analyses of the magnitude associated with the area of spatial coverage, probability of occurrence and duration of the actions and the importance of the impacts on the environmental factors associated with the action, temporality/duration and degree of reversibility of the action. Therefore, the greater the impact, the higher the assessment. The assessment uses 1 to 3 following the methodology of Leopold et. (1971) so that even the least significant impact was considered in the assessment.

1.6.2 ESIA Methodology

The Environmental and Social Impact Assessment (ESIA) methodology consists to evaluate the environmental feasibility to install the forest component of the PARACEL project.

This assessment performed a systemic approach of the forest component, taking into account its main characteristics, as well as the physical, biotic and socioeconomic environment at its areas of influence. Later, in the analysis of the environmental impacts, the possible impacts, at the same environments, resulting from the implementation and operation of the forest plantation were pointed out, as well as their respective mitigation and enhancement measures.

1.6.3 Structure of the ESIA Report

The structure of the ESIA is as follows:

- Volume I – Description of Project
- Volume II – Baseline Conditions
 - Part I – Physical Environment
 - Part II – Biotic Environment
 - Part III – Socioeconomic Environment
- Volume III – Impact Identification and Analysis

2 LEGAL ASPECTS

2.1 National and Local Laws and Regulations

2.1.1 Principles of Environmental Law

It is necessary to mention the main bases of environmental law in Paraguay. In other words, it will be about the fundamental bases that have created the environmental normative framework and consequently the Science of Environmental Law in Paraguay, which are the guides for the interpretation and application of the laws for the PARACEL project.

When referring to principles, these precedents in Environmental Law are considered to be the normative, legislative, jurisprudential and administrative bases themselves. The initial documents exposing the Principles of Environmental Law are: the Stockholm Declaration on the Human Environment of 1972; the World Charter for Nature of the General Assembly of the United Nations of 1982 and the Rio Declaration on Environment and Development of 1992.

In the field of Environmental Law the principles constitute an interpretative, informing and guiding instrumental force more powerful than in any other field or science.

Principle of Sustainable Development: Jurists have called it "the principle of principles" of Environmental Law today: the dominant paradigm in the field of Environmental Law is structured on this principle, which is inserted in the basic universal norms, or its cogens at an international level, and which has been constitutionalized in most of the constitutional orders of the world and without doubt in the constitutional order in Paraguay. This principle is the result of a synthesis between environmental conservation and economic development which pressured and polarized policies and the interpretation of environmental norms from their very origin. It assumes an integration of these two interests or purposes, at a higher level of human, socio-cultural and legal projection. It must be stated that sustainable development constitutes a principle, since one of its characteristics is that it is formulated as an axiom.

The principle of sustainable development has been deeply influenced by the weight of international negotiations and environmental policy formulation through consensus.

The Brundtland Report (1987) states that: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is clear that this formulation responds to an anthropocentric perspective, although it synthesizes and integrates environmental conservation and economic activity in decision-making processes.

Solidarity: This principle is based on the Modern State, which considers the environmental legal good located in the social sphere; that is, the necessary coordination of interests and legal spheres is imposed, coordination in accordance with the Objectives of Sustainable Development (ODS). The principle of solidarity has projections in a long spectrum, as it is combined in an intergenerational and intragenerational dimension.

From the first perspective, the rights and duties of compensation for the sacrifices that arise for specific groups or individuals from the effective application of environmental protection, and from the second perspective, the rights and duties of safeguarding the capacity of future generations to obtain from other species and from natural resources, sufficient means for the maintenance of the human project in the balance of ecosystems.

The principle of solidarity is implicit in the principle of sustainable development and in the cooperation of government and society. It is present in the Johannesburg Declaration - Point 17: States committing themselves to sustainable development show that they are aware of how important solidarity between people and cooperation between society are.

Prevention: Principle related especially to environmental protection policies. This principle is fundamental when there is a potential for non-redress of environmental damage resulting from activities with environmental risk to third parties. For example, there may be irreversible environmental damage such as extinction of species, radioactivity, destruction of flora, desertification of rural areas, etc. when Prevention is not used to avoid environmental damage. Environmental impact study is a mechanism to implement this principle.

Precaution: also called the precautionary principle (Rio Declaration, Principle 15), it is stated that "in order to protect the environment, States should apply the precautionary approach according to their capabilities. That is, in cases of serious danger or irreversible damage, the absence of scientific knowledge and certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation". Nor can the absence of certainty be invoked as a justification for the development of an activity, the impact and effect of which on the environment is not sufficiently known.

This principle also brings others that are derived from it, such as the principle of a high level of protection or the principle of "stand still" (no degradation), which impose, as a maximum and respectively, the preference for the adoption of the highest possible level of protection provided by environmental measures and the commitment not to lower or reverse these levels of protection in projects that generate impacts.

Liability (polluter-pays): Principle 13 of the Rio Declaration proclaims "the duty of States to develop national law concerning liability and compensation for victims of pollution and other environmental damage". To this criterion, effectiveness is an objective of Environmental Law declared by Principle 11 of the Rio Declaration, which proclaims "the duty of States to enact effective laws on the environment". Also called user-payer, it brings the characteristic of retribution for the use of non-renewable natural resources.

Cooperation: this principle has the great objective of "establishing a new and equitable global partnership by creating new levels of cooperation between States, key sectors of societies and individuals". It is most explicit in Principle 7, which establishes the duty of States to cooperate to conserve, protect and restore the health and integrity of the ecosystem.

Common but differentiated responsibilities: The Rio Declaration states "Since they have contributed in varying degrees to the degradation of the global environment, States have common but differentiated responsibilities. Developed countries recognize their responsibility in the international pursuit of sustainable development, in view of the pressures on their societies from the environment and the technologies and financial resources at their disposal". The Climate Change Treaty (UNFCCC) is an example of common but differentiated responsibility.

2.1.2 Legal Considerations

PARACEL recognizes the environmental laws and regulations that govern its planning and activity, so it will be respectful of compliance with the legal aspects of environmental protection, human health and land use regulation.

Paraguay created by means of Law 1,561/2000 the National System of the Environment integrated by a group of public entities of the national, departmental and district governments with environmental competence.

Article 1. The purpose of this law is to create and regulate the operation of the agencies responsible for the elaboration, standardization, coordination, execution and control of the national environmental policy and management.

These regulations also created the National Council for the Environment (CONAM), which has the following functions:

- a) to define, monitor and evaluate national environmental policy;
- b) to propose norms, criteria, guidelines and standards in the matters submitted to its consideration by the Secretariat of the Environment;
- c) cooperate with the Executive Secretary of the Secretariat for the compliance with this law and its regulations; and
- d) the others that correspond to it in accordance with the law.

Paraguay has a National Environmental Policy (PAN).

The national environmental Policy (PAN, in Spanish) brings together the set of objectives, principles, criteria and general guidelines for the protection of the environment and society, in order to guarantee sustainability for current and future generations, as established in the legal framework.

It is based on the following foundations:

- The environment is a common heritage of society; on its quality depend the life and development possibilities of the communities of Paraguay;
- The sustainability of the country's development is strongly linked to the use and adequate management of its natural resources and to sustainable production, improvement of the quality of life of the population, achievement of equity and full participation in socioeconomic development;
- The preservation, conservation and recovery of the natural and cultural heritage are crucial for the sustainability and improvement of the quality of life of the communities. Socio-economic development needs environmental sustainability;
- Environmental and cultural issues of a regional or transboundary nature are a priority. Regional integration initiatives based on sustainable management, conservation of shared ecosystems and recognition of cultural identities will be promoted.

The principles of PAN are the following:

- Sustainability: present generations are responsible for environmental protection and should ensure the appropriate use and enjoyment of the natural heritage that will be passed on to future generations;

- Precaution: where there are threats of serious or irreversible damage, lack of information or scientific certainty should not be used as a reason for postponing effective action;
- Integrity is understood as the need to agree on sectoral policies and to adjust the national, departmental and municipal legal framework, making the regulations that provide greater protection to the environment prevail;
- Graduality: is assumed as the capacity of continuous adaptation and improvement;
- Responsibility: the person who has caused damage to the environment must repair the damage and restore the affected conditions;
- Subsidiarity: environmental management will be organized in such a way as to achieve the maximum social protagonism in decision making, efficiency in the use of resources and in obtaining results, guaranteeing that decision making is as close as possible to the citizen.

The National Environmental Policy has as its general objective:

- To preserve and adapt the use of Paraguay's natural and cultural heritage to guarantee the sustainability of development, the equitable distribution of its benefits, environmental justice and the quality of life of the present and future population.

The National Environmental Policy has the following specific objectives:

- To generate conditions for the well-being and improvement of the quality of life of people, preventing the degradation of habitats;
- Prevent environmental deterioration, restore degraded ecosystems, recover and improve the quality of natural and cultural heritage resources, mitigate and compensate for environmental impacts on the population and ecosystems;
- Apply the precautionary principle in the face of environmental risks that could affect human health;
- Optimize the use of natural resources in production processes;
- To promote and articulate projects for the conservation and sustainable use of water, air, soil and biodiversity resources;
- Make the economy dynamic by gradually reconverting production processes, introducing the principles of sustainability in the production and service sectors and promoting pollution prevention;
- Promote the increase of efficiency in the productive processes through the sustainable use of soil, water, energy and other inputs, encouraging their reuse, recovery and recycling with the adoption of good environmental management practices;
- To promote the rights and human development of indigenous peoples, in a way that is compatible with the conservation of biodiversity in their territories and to harmonize traditional life systems with their current socio-cultural needs.

- To promote and coordinate public policies for the sustainable use of environmental opportunities in accordance with social demand, equity and justice;
- To actively involve citizens in decision making and environmental management;
- Strengthen environmental institutions at all levels, especially at the departmental and municipal levels, in an orderly and decentralized process, to achieve their full integration into the National Environmental System (SISNAM);
- To promote coordination and stimulate intersectoral alliances;
- To promote compensation and access to justice when, due to environmental restrictions for the common benefit, the heritage of individuals is affected;
- To update environmental law in order to develop efficient management instruments;
- To follow up and make effective international conventions, agreements and treaties;
- Disseminate environmental information, facilitate and encourage the formation of public awareness about the conservation and sustainable use of natural resources.

2.1.3 Environmental Law

Paraguay National Constitution – 1992

The Constitution, which has been in force since 1992, contains provisions relating to the environment. The most significant provisions and their most relevant content related to the PARACEL Project are indicated below:

“Article 6: Of the Quality of Life

The quality of life shall be promoted by the State through plans and policies that recognize conditioning factors, such as extreme poverty and the impediments of disability or of age.

The State shall also promote research on the factors of population and their links with socioeconomic development, with the preservation of the environment and with the quality of life of the inhabitants.

Article 7: Of the Right to a Healthy Environment Everyone has the right to live in a healthy and ecologically balanced environment.

The preservation, the conservation the re-composition and the improvement of the environment, as well as its conciliation with the complete [integral] human development, constitute priority objectives of social interest. These purposes orient the legislation and the pertinent governmental policy.

Article 8: Of Environmental Protection The law will regulate the activities susceptible of producing [an] environmental alteration. In the same way, it may restrict or prohibit those activities that it qualifies as dangerous.”

What happens is that the State, through MADES, establishes the process of environmental licensing to protect diffuse rights such as ensuring the protection of the environment. The ESIA is the appropriate instrument to investigate environmental factors and the alterations suffered by the natural (physical, biotic) and socioeconomic (landscape ecology, socioeconomic dynamics, employment generation, etc.) environment.

The process of impact evaluation guarantees the preservation of the environment and social and economic development. The change in the quality of life and environmental condition in the project's area of influence is evaluated by the Independent Consultancy and approved by MADES' technical team.

The impact of changes in the quality of life must be evaluated, as the interest of the population in the PARACEL project's Area of Influence is protected.

With respect to the right to a healthy environment, it is clear that Paraguayan citizens have the right to live in an ecologically balanced environment.

The preservation, conservation, compensation and improvement of the natural environment is a priority for developing countries (e.g. Paraguay).

The environmental licensing process before MADES aims at reconciling economic development with environmental protection. This becomes the principle of sustainable development.

For this reason, article 8 of the National Constitution of Paraguay establishes that the law will regulate the activities that can produce environmental impacts (alteration, transformation or modification of the environment).

Law 1,561/2000 – National Environmental System, The National Environmental Council and the Secretariat of the Environment

The secretariat is an autarkic, autonomous entity with legal personality under public law, its own assets and indefinite duration (Article 7). The national environmental policy is formulated, executed and its control is the responsibility of the secretariat.

Thus, considering those legal competences, this entity has authority and is responsible for applying the following laws:

Law 294/1993 - Environmental Impact Study (modified by Law 345/1994 and regulatory decree and all those legal provisions (laws, decrees, international agreements, ordinances, resolutions and regulations affecting the environment).

Law n. 6,123/2018 - elevates the Secretariat of the Environment to the rank of Ministry and changes its name to the Ministry of the Environment and Sustainable Development

It should be reported that the national environmental system was recently altered, changing SEAM to the Ministry of Environment and Sustainable Development.

In other words, the environmental law whose text has been passed in this work mentions SEAM. For reasons of accuracy and loyalty to the original text, the term "SEAM" was not changed to "MADES", preserving the faithful text as originally published in the Official Press.

Art. 1. The Secretariat of the Environment, which depends on the Presidency of the Republic, shall be promoted to the rank of Ministry and shall be called the Ministry of the Environment and Sustainable Development. It shall have the objective of designing, establishing, supervising, controlling and evaluating the National Environmental Policy, in order to comply with the constitutional precepts that guarantee national development based on the right to a healthy environment and environmental protection.

The Ministry of the Environment and Sustainable Development shall be governed by the provisions of Law n. 1561/00 "which creates the national system of the environment, the national council of the environment and the secretariat of the environment", in the relevant part which are not repealed and do not contravene the provisions of this Law.

(PARAGUAY, 2018)

Law n. 294/1993, Environmental Impact Study

As it was said, this law declares the Environmental Impact Study (section 1) mandatory when an activity or undertaking may generate an environmental impact. Environmental impact is legally defined as *"any modification of the environment brought about by human works or activities which have a positive direct or indirect effect on life in general, on biodiversity, on the quality or significant quantity of natural or environmental resources and their exploitation, on well-being, on health, on personal safety, on habits and customs, on the cultural heritage or on legitimate livelihoods"*.

Article 78 declares:

Article 7: An Environmental Impact Study shall be required for the following works projects or public or private activities:

(...)

b) Agricultural, livestock, forestry and farming exploitation;

Thus, it is clear that the implementation of a Eucalyptus forest is included among the activities to be presented in the Environmental and Social Impact Assessment.

Law 3,001/06 – Valuation and remuneration of environmental services

The main objective of this law is to promote the conservation, protection, recovery and sustainable development of the country's biological diversity and natural resources, through the fair, timely and adequate valuation and remuneration of environmental services.

Article 2 - “Environmental services” are understood to be those generated by human activities for the management, conservation and recovery of ecosystem functions that directly or indirectly benefit the populations:

- a) Environmental services related to the mitigation of greenhouse gas emissions: fixation, reduction, sequestration, storage and absorption of carbon and other greenhouse gases. The activities to be compensated or financed by this service include protection and management of: forests, reforestation projects, urban arborization, forestry component of agroforestry projects or systems, reforestation of riverbanks and springs, palm groves, regardless of the size or magnitude of the project concerned;
- b) Environmental services for the protection of water resources for different modes of use (energy, industrial, tourism, domestic, irrigation, etc.) and their related elements (aquifers, springs, water sources in general, wetlands, protection and recovery of basins and micro-basins, trees, etc.);
- c) environmental services related to the protection and sustainable use of biodiversity: protection of species, ecosystems and forms of life; access to elements of biodiversity for scientific and commercial purposes;
- d) environmental services of scenic beauty derived from the presence of forests and natural landscapes and the existence of elements of biodiversity and protected wild areas, whether state or private, duly declared as such; and,
- e) environmental services for the protection and recovery of soils, and for mitigating damage caused by natural phenomena.

Law 836/80 – Sanitation Code

When it comes to the issues of environmental sanitation, soil contamination and pollution, and surface or groundwater, the Health Code must be addressed. The Environmental Impact Study deals with the impacts related to water, air and soil quality.

The main objective is to limit the actions of the venture with respect to the following:

Article 66: It is forbidden any action that deteriorates the natural environment, diminishing its quality and turning it into a risk for health.

Article 67: The Ministry shall determine the tolerance limits for the emission or discharge of pollutants in the atmosphere, water and soil and shall establish the rules that the labor, industrial, commercial and transportation activities must follow in order to preserve the environment from deterioration.

Article 68: The Ministry shall promote programs aimed at the prevention and control of environmental pollution and contamination and shall provide measures for its preservation, having to carry out periodic controls of the environment to detect any element that causes or may cause deterioration of the atmosphere, soil, water and food.

The water will be obtained from small dams (deposits with water accumulation used in cattle rising) and, in some cases, from artesian wells.

Law 123/1991 – Adopt new forms of phytosanitary protection

This law adopt the following phytosanitary protection standards, without prejudice to the Sanitation Code, as well as the other laws and their respective regulations:

- a) Establish and control the phytosanitary conditions that must gather plant products and any other means capable of spread pests for their entry into the country, temporary or permanent under any hospitalization regime;
- b) Arrange for the application of disinfection treatments and disinfestation of products, means of transport, packaging and local, adequate to human and environmental health standards ambient;
- c) Order the destruction of plants, merchandise or products contaminated vegetables, when they pose a risk to spread of pests in the country;
- d) Establish general, regional, quarantine regimes, permanent or temporary, preventive or treatment;
- e) Establish quarantine, disinfection, disinfestation of plant products, means of transport and packing;
- f) Prohibit the commercialization of any type of products plants when they constitute means of dissemination of pests; and,
- g) Prohibit the operation of packing plants, processing of vegetable products, maintenance of means of transport whose operating conditions constitute a risk to the spread of pests or to conservation of quality and health conditions in post-harvest.

Article 7. Every owner or occupant of a real estate, whatever their title, or holder of plants or plant products, containers or objects containing or carrying a production pest plant, is obliged to combat and destroy it.

During the first 6 years, a supply of wood from Brazil and Argentina is foreseen by PARACEL. Law 123/1991 also provides for the following for the import of wood products into the country:

Article 14. For importation, temporary admission, warehouses in free zones or transit of vegetable products must have the prior import authorization granted by the competent body.

Article 15. In the event that a phytosanitary problem is detected, according to its nature and / or potential risk, the Enforcement Authority shall prohibit their entry or order

their re-export, disinfection, disinfestation or subjecting it to a post-admission quarantine regime. The expenses required for the execution of these measures are in charge of the corresponding importers.

Article 17. For the entry into the national territory of vegetable products, must have a phytosanitary certificate issued by the competent authorities of the country of origin.

Article 19. The Enforcement Authority may proceed to confiscate and destroy of vegetable products that enter the country by any means and under any regime, without phytosanitary import permit and the phytosanitary certificate from the country of origin.

Resolution 50/06 – National Water Resources Management

By which the regulations for the management of the water resources of Paraguay are established in accordance with Article 25 of Law 1,561/00, which creates the National System of the Environment, the National Council of the Environment and the Ministry of the Environment.

Article 1 - Violations of the rules for the rational use of surface and underground water resources:

- Non-compliance with Article 1898 of the Paraguayan Civil Code and its amendments;
- The failure to: Law 350/94, Law 1195/86, Law 177/69, Law 4/92, Law 836/80, the Rural Code, Law 1248, Law 1614/00, SEAM Res. 222/02, Law 389/73, Law 433/73. In the criminal field, Articles 197 and 200 of the Criminal Code, criminalization of water pollution and alteration, illegal processing of waste and Law 716; and
- The failure to comply with laws 422/73, 42/90, 112/91, 232/93, 251/93 and all the provisions of Law N. 294/93 also constitute infringements for the preservation of water resources.

Law 3,239/2007 – Paraguay Water Resources

The purpose of this law is to regulate the sustainable and integral management of all waters and the territories that produce them, regardless of their location, physical state, or their natural occurrence within Paraguayan territory (article 1).

Article 3° - The integral and sustainable management of Paraguay's water resources shall be governed by the following Principles:

- a) Water, whether surface or underground, is the public property of the State and its ownership is inalienable and imprescriptible.
- b) Access to water for the satisfaction of basic needs is a human right and must be guaranteed by the State, in adequate quantity and quality

- c) Water resources have multiple uses and functions and this characteristic must be adequately addressed, respecting the hydrological cycle and always favoring, in the first place, the use for consumption by the human population.
- d) The river basin is the basic unit for water resources management
- e) Water is a natural good that conditions the survival of all living beings and the ecosystems that shelter them.
- f) Water resources are a finite and vulnerable good.
- g) Water resources have a social, environmental and economic value.
- h) Water resources management should be carried out within the framework of sustainable development, and should be decentralized, participatory and gender-sensitive.
- i) The Paraguayan State possesses the non-transferable and non-delegable function of property and guardianship of national water resources.

Priority will be given to the use and development of surface and groundwater resources for human consumption. Other uses and developments shall be prioritized as follows (Article 18):

(...)

d) Use and exploitation for energy generation.

e) Use and exploitation for industrial activities.

(...)

It is important to observe the location of the project on the margins adjacent to the water courses. In this specific case, it was defined by law that a water source protection zone 100 (one hundred) meters wide on both banks must be protected, in which the use of the soil and the activities carried out there will be conditioned, according to what is established by environmental legal regulations. The protection zone shall not include the public use zone and shall be adjacent to it.

National Law 3,239/2007 defines in Article 28 the following:

Article 28: Prior to its execution, all works or activities related to the use of water resources shall be submitted to the Environmental Impact Study procedure provided for by Law n. 294/93 "Environmental Impact Study" and its regulations. Excepted from this obligation are the uses related to the exercise of the right provided for in Article 15 of the present Law.

PARACEL has complied with the law and regulations concerning environmental impact study: Law 294/1993 (art. 7) defines which of the works and activities require Environmental Impact Study.

Thus, in the same way the law of water resources also establishes rules to obtain permits for the use of water resources.

It is not unknown that in the present project PARACEL will be the holder of a water use permit in precarious title, although not the domain or any other property right over the same. Thus, it is understood that the permit is revocable, so that its suspension or revocation will not give rise to any compensation when there is a justified cause.

As from this Law, the use of Water Resources or their channels is prohibited without a permit or a Concession granted by the Water Resources Authority.

PARACEL will be aware of the fact that prior to the granting of the Environmental Impact Statement by MADES, the Water Resources authority will issue a certificate of water resources availability.

This certificate of availability is a proof to guarantee that the priority uses will not be damaged. Therefore, PARACEL will subsequently obtain the permit to manage water resources in its production process.

It is also relevant to observe the law that deals with the protection of forests that protect watercourses.

Therefore, it is necessary to evaluate the technical and legal conditions of the site: location of the project, type of vegetation on the margin of the Paraguay River, need to implement access or infrastructure etc.

The institution that regulates and defines the level of protection to the forests is the National Forest Institute - INFONA, but this is evaluated jointly with the General Direction of Control of the Environmental Quality and Natural Resources (DGCCARN) in the structure of the Ministry of the Environment.

Law n. 4,241/2010 - Restoration of Protective Forests of Watercourses within the National Territory

This law is regulated by Decree 9824/12, which establishes the necessary guidelines for compliance with the aforementioned law, and regulates aspects related to the width of forests that protect watercourses, as well as the establishment of a Program for the Restoration of Forests that Protect Watercourses for those properties whose surface contains watercourses that do not have the minimum width of protective forests.

Article 5. Establish the minimum parameters to be restored according to the width of the waterway and the particularities of the area of influence of these, which constitute the basis for planning the waterway protective forest areas for the Eastern Region, according to the following table.

Channel Width	Minimum width of protective forest on each border (m)
More than or equal to 100 m	100
50 to 90 m	60
20 to 49 m	40
5 to 19 m	30
1.5 to 4.9 m	20
Less than 1.5 m	10
Water fountain	Minimum 30 m to be preserved

With respect to the management of forests and native vegetation it will be necessary to evaluate before the Ministry (MADES) the fulfillment of retribution of environmental services or substitution by a project of compensation and new plantations of the native vegetation.

Resolution SEAM 222/2002 – States the standard of quality of the waters in the national territory is established

This resolution establishes the classification of the waters of the national territory according to the use made of them; and in turn, it establishes the quality standards for each of the types of water. Article 1 establishes the classification of the waters of the national territory. Articles 2, 3, 4 and 5 establish the limits and/or conditions for waters of class 1, 2, 3 and 4 respectively.

Article 6 establishes the quality parameters for waters intended for recreational use. While Article 7 establishes the limits of effluent quality to be discharged into water bodies. Article 7 establishes that effluents from any polluting source may only be directly or indirectly discharged into bodies of water in accordance with the conditions, standards and criteria established in the classification of the water body.

In the case of PARACEL, it is necessary to comply with the effluent emission parameters, which are established in Resolution SEAM 222/2002.

Art. 8 The dissolution of industrial effluent with unpolluted water is not permitted.

(...)

Art. 15 In class I waters, the discharge of domestic and industrial waste water as well as of any potentially toxic substance will not be tolerated.

Considering that the Paraguay River is a Class 2 water body, therefore, the standards defined by these regulations must be complied with..

Art. 1: They are classified, according to their predominant uses, in 4 classes of the National Territory.

(...)

Class 2 – Water destination:

- (a) For domestic supply after conventional treatment
- (b) For the protection of aquatic communities
- c) For primary contact recreation (water skiing, swimming)
- (d) Irrigation of vegetables that are consumed raw, fruits that grow in the soil and are grafted raw without removal of the film.
- (e) Natural and/or intensive breeding (aquaculture) of species intended for human consumption.

Thus, Resolution 222/2002 establishes the legal limits for this river classification.

Art. 3° For Class 2 waters, the same limits are established under Class 1 conditions, with the exception of the following conditions:

- a) No artificial coloring shall be permitted unless it is removed by conventional coagulation, sedimentation and filtration
- b) Coliforms for primary contact recreation use shall be complied with Art. 6 of this resolution. For other uses, the limit of 1000 coliforms per 100 ml shall not be exceeded by 80 % or more of at least 5 samples per month,
- c) Colour: up to 75 Pt/l
- d) Turbidity: up to 100 UNT
- e) BOD 5d 20° C up to 5 mg/l
- f) OD, in any sample: not less than 5 mg/l O₂
- g) Total Phosphorus or Total Nitrogen: respectively up to 0,05 mg/l and 0,6 mg/l

In addition, regarding the limits of effluent quality to be discharged into water bodies, it should be noted that the PARACEL project is based on international standards, such as ‘Effluent Guidelines for Pulp and Paper Facilities – Bleached Kraft Pulp, Integrated’ by IFC, as shown in the table below.

Effluent Guidelines for Pulp and Paper Facilities - Bleached Kraft Pulp, Integrated		
Parameter	Units	Guideline
Flow ^a	m ³ /ADt	50
pH	-	6 - 9
TSS	kg/ADt	1.5
COD	kg/ADt	20
BOD ₅	kg/ADt	1
AOX	kg/ADt	0.25
Total N	kg/ADt	0.2 ^b
Total P	kg/ADt	0.03

a Cooling water and other clean water are discharged separately and are not included.

b Any nitrogen discharge associated with the use of complexing agents should be added to the figure of tot -N.

Resolution SEAM 255/06 – Establishing the Classification of Waters of the Republic of Paraguay

This Resolution states, in a preventive manner, the classification of all waters in Paraguay in Class 2, in accordance with the provisions of SEAM Resolution 222/02.

This is due to the need to anticipate more effective preventive instruments and more efficient mitigating or compensatory measures, in order to reduce environmental risks and prevent water quality degradation.

Law 3,956/09 – Integral Solid Waste Management in the Republic of Paraguay

The purpose of these regulations is to establish and apply a legal regime for the generation and responsible management of solid waste, whose regulatory content and practical usefulness should lead to the reduction of such waste to a minimum and avoid situations of risk to human health and environmental quality (article 1).

Municipalities and their relationship with Solid Waste:

Article 9.- Municipal Competence. The municipalities are responsible for environmental protection and cooperation with environmental sanitation, especially with regard to urban and domestic cleaning services, including all phases of integrated solid waste management.

Article 23.- Recycling. The solid residues, whose characteristics allow it, shall be used by means of its use or reincorporation to the productive process as secondary matter, without representing risks to the health and the environment.

It should be noted that the following are considered as "recovery systems": recycling, recovery, reduction, composting and others that the technology develops and is authorized by the competent authorities.

Article 4.- Classification. Solid waste will be classified according to its origin and composition, in accordance with the technical criteria established in this Law and its regulations.

Article 8 decree 7,391/2017 (law regulation):

Art. 8 - Classification of Solid Waste

The Authority of Application will group and subclassify the hazardous, solid urban and special management waste in categories, with the purpose of preparing the corresponding inventories, and guide the decision making based on risk criteria and management.

The decree classifies the waste in:

- I. Municipal solid waste, as defined in Article 4, and
- II. Special handling wastes considered as non-hazardous, including the following
 - a) Waste from health services, generated by establishments that carry out medical-care activities for human or animal populations, research centers, development or experimentation in the area of pharmacology and health, with the exception of biological-infectious waste, as defined

in Law 3361107 on Waste generated in Health and Related Establishments.

b) Industrial waste: that generated in production processes and industrial and commercial facilities, not assimilated to solid urban waste and not included in Law 567/95

(c) Those generated by agricultural, fishing, forestry and livestock activities, including waste from inputs used in those activities.

d) Those generated by transport services, as a result of the activities carried out in transport terminals such as ports, airports, customs terminals, bus and railway terminals.

e) Civil construction waste, generated in the construction, maintenance, alteration, repair and demolition of civil engineering works in general, including waste resulting from the preparation and excavation of land for civil engineering works

f) Technological waste from the computer industry, manufacturers of electronic products or motor vehicles and others which, at the end of their useful life, require specific handling

(g) Dehydrated sludge or sludge from the treatment of waste water

h) Used tires, furniture, large-volume household goods, plastics and other slowly degrading materials

i) Those from industrial, chemical, biological, production or research laboratories

j) Mining and hydrocarbon waste: generated in the activity of exploration, extraction or benefit of minerals.

k) The others that are determined by Decree of the Executive Power or by the Authority of Application in agreement with the governments and municipalities, which thus agree to facilitate their comprehensive management.

III. Hazardous wastes provided for in Law 567/95 and its regulations

PARACEL and Solid Waste matters:

Article 3.- Principles. This Law is based on the following principles:

- a) a) Principle of Co-responsibility. The generator of waste or the cause of any current or future degrading effect on the environment is responsible, together with the relevant authorities, for the cost of preventive or corrective recomposition actions.

Article 13.- Rights of individuals. In the process of solid waste management, the following will be considered as people's rights

- a. access to temporary or final solid waste deposits, structured in accordance with the provisions of this Law and its regulations;
- b. obtaining computerized data from the Ministry of Public Health and Social Welfare, the Secretariat of the Environment and the Technical Secretariat for Planning and Development, especially in relation to carrying out the stages in solid waste management; and,
- c. the protection of health and the environment from risks or damage that may occur during all stages of solid waste management.

Article 14 - Duties of individuals. In the process of solid waste management, the following will be considered as people's duties

- a) pay, in a timely manner, the services provided by the municipality, cancel the penalties and other charges applied by the mentioned agency;
- b) comply with the standards and technical recommendations that have been established by the competent authorities;
- c) store solid waste and residues subject to sanitary and environmental regulations, to avoid damage to third parties and to facilitate their collection, as established in this Law and its regulations.

Article 15 - Minimization. The generator shall adopt measures to minimize solid waste, through technologically viable production processes, subject to the determination of the competent authority and the provisions of this Law and its regulations. The municipal authorities and the generators shall agree on the elaboration of projects and development of programs of minimization of the same, in the conditions and within the term determined by the competent environmental and sanitary authority.

Article 17.- Initial provision. The generation of the solid waste implies obligations in the generator; therefore, it must make the previous storage in containers adapted to its volume, handling and particular characteristics, in order to avoid its dispersion.

Article 18.- Of the containers. The containers and recipients used for the temporary storage of the solid residues must fulfill the following minimum requirements:

- a. Be reusable;

- b. Be properly located and covered;
- c. Have the capacity to store the volume of solid waste generated, taking into account the frequency of collection;
- d. Be hermetically sealed;
- e. Be built with waterproof materials and with the necessary resistance for the use to which they are destined;
- f. To have an adequate sanitary maintenance;
- g. To Have the identification related to the use and types of solid waste; and
- h. Any other that the municipality considers, according to the technical criteria existing in the Local Plan for Solid Waste.

Law 3,742/2009 – Control of phytosanitary products for agricultural use

Forest plantations such as those that will be implemented by PARACEL usually need to carry out Integrated Pest Management (IPM) by which it seeks to make use of the association of techniques applicable to the management of the populations of the main crop pests, in order to achieve coexistence with harmful agents, without causing damage to the forest.

The application of phytosanitary pesticides is one of the stages of this integrated management and the control of these products as well as the correct procedure for the disposal of empty packages are established by law 3,741 / 2009, specifically in the following articles:

Article 1. This Law establishes the legal regime for the registration and control of all phytosanitary products for agricultural use as of their entry into the national territory, as well as: synthesis, formulation, fractionation, transportation, storage, labeling, marketing, advertising, application and elimination of waste and final disposal of empty containers and expired pesticides, in order to protect human, animal, and plant health, and the environment.

Article 46.- The containers and packaging of phytosanitary products must never be used to contain water or food destined for human or animal consumption.

Article 49.- The commercialization and distribution entities must indicate in their sales invoices the places of return of the containers of phytosanitary products already used by the producer or user.

Article 51.- It will be the responsibility of the producers or users to carry out the triple washing or pressure washing of the containers, immediately after emptying the container during the preparation of the broth or mixture, in addition to

piercing the base and returning the empty containers to the centers or mini-collection centers indicated in the sales invoice of the product issued by the marketer or distributor of the same. In addition, they must have a place for the temporary storage of empty containers, where they will remain until they are actually returned.

Article 64.- The applicators of phytosanitary products for agricultural use by air and land, whether mechanized or costal, are obliged to keep the records of applications, which will have the character of a sworn statement, where the operations carried out must be recorded.

Article 67.- Every person involved in the handling and application of phytosanitary products for agricultural use, must have the appropriate protective equipment, in order to avoid poisoning.

Article 68.- The supply and cleaning of the application equipment must be carried out away from water courses or sources, in order to avoid possible contamination.

Article 69.- People involved in the aerial or terrestrial application of phytosanitary products for agricultural use, must know: trade names, technical names, their effects, risks, safety precautions and first aid measures, of the products to be used.

Law 1,100/1997 - Prevention of noise pollution

That law sets the maximum permissible noise levels. For PARACEL's pulp mill and forest operations, the limits comply with those of Article 9 and 10.

Scope	Night 20:00 to 07:00	Day 07:00 to 20:00 14:00 to 19:00	Day (Occasional peak) 07:00 to 12:00
	Measured in decibels "A". Db(a) 20 to 40		
Residential areas of specific use, public spaces: recreation areas, parks, squares and public roads.	45	60	80
Mixed areas, transition zones, urban centers, specific programs, service zones and public buildings	55	70	85
Industrial area	60	75	90

Source: Law 1.100/1997

In addition, it should be noted that the PARACEL project is based on international standards, such as noise level guidelines from the General EHS Guidelines of IFC, as shown in the table below.

Receptor	Day 07:00 to 22:00	Nighttime 22:00 to 07:00
	One Hour L_{Aeq} (dBA)	
Residential; institutional; educational	55	45
Industrial; commercial	70	70

Source: General EHS Guidelines: Environmental - Noise Management by IFC, 2007.

Occasional peaks refer to discontinuous noises and sounds that exceed the permitted levels in the corresponding area and that occasionally occur during the day, with a maximum of twenty peaks per hour. This noise and sound level will only be permitted during the following hours: from 7.00 to 12.00 and from 14.00 to 19.00.

The maximum levels may not be exceeded within any neighboring property or on the public highway. Measurements are taken with an automatic recording device, calibrated and sealed by the municipalities, using the "A" compensation scale and in an impulse response, with the observer preferably located in front of an open side of the affected property or on the public highway.

The device must be at least 1.2 meters away from any obstacle and covered, in order to avoid the potential wind effect.

Resolution SEAM 259/15 – States the permissible air quality parameters (according to Law 5,211/14 Air Quality)

PARACEL must be vigilant for industrial emission controls.

Although Paraguay has no standards for industrial air emissions, PARACEL must comply with air quality parameter.

It is not permitted for emissions to the environment to generate odors or aromas that may cause discomfort, or for solvents and other chemical products to be released that are harmful or injurious to human health (Article 1).

Parameters	Annual Average	Average in 24h	Average in 8h	Average in 1h
PM _{2,5}	15 $\mu\text{g}/\text{m}^3$	30 $\mu\text{g}/\text{m}^3$		
PM ₁₀		150 $\mu\text{g}/\text{m}^3$		
O ₃			120 $\mu\text{g}/\text{m}^3$	
NO ₂	40 $\mu\text{g}/\text{m}^3$			200 $\mu\text{g}/\text{m}^3$
SO ₂		20 $\mu\text{g}/\text{m}^3$		
CO			10 $\mu\text{g}/\text{m}^3$	

Therefore, PARACEL shall use the best available technologies and best environmental practices. Thus, collection and absorption devices will be adopted to prevent the

dispersion of pollutants in the atmosphere, which will be purified before their final disposal.

It was not possible to find specific regulations for the Municipality of Concepción, but it is understood that it is necessary to comply with air quality regulations in order to establish a legal standard for PARACEL. In addition, it should be noted that the PARACEL project is based on international standards, such as the guidelines from the ‘Emission Guidelines for Pulp and Paper Facilities’ by IFC, as shown in the table below.

Emission Guidelines for Pulp and Paper Facilities			
Parameter	Type of Mill	Units	Guideline Value
TSP	Kraft, bleached	kg/ADt	0.5
	Kraft, unbleached—Integrated	kg/ADt	0.5
	Sulfite, integrated and non-integrated	kg/ADt	0.15
SO ₂ as S	Kraft, bleached	kg/ADt	0.4
	Kraft, unbleached—Integrated	kg/ADt	0.4
	Sulfite, integrated and non-integrated	kg/ADt	1.0
NO _x as NO ₂	Kraft, bleached	kg/ADt	1.5 for hardwood pulp 2.0 for softwood pulp
	Kraft, unbleached—Integrated	kg/ADt	1.5 for hardwood pulp 2.0 for softwood pulp
	Sulfite, integrated and non-integrated	kg/ADt	2.0
TRS as S	Kraft, bleached	kg/ADt	0.2
	Kraft, unbleached—Integrated	kg/ADt	0.2

Source: Environmental, Health, and Safety Guidelines: Pulp and Paper Mills by IFC, 2007.

Notes:

TSP - Total Suspended particulates; SO₂ - Sulfur dioxide; S – Sulfur; NO₂ - Nitrogen dioxide; TRS - Total reduced sulfur compounds; kg/ADt - kilograms pf pollutant per 1,000 kg of air dry pulp.

2.1.4 Forestry Law

Law 422/1973 – Forestry Law

That law sets principles for use and rational management of forests and forest lands of the country, as well as the renewable natural resources that are included in the regime of this law. Likewise, it is declared of public interest and mandatory protection, conservation, improvement and enhancement of forest resources.

Article 2. The fundamental objectives of this Law are:

- a. The protection, conservation, increase, renewal and sustainable and rational use of the country's forest resources;

- b. The incorporation into the national economy of those lands that can maintain vegetation forestry;
- c. Soil erosion control;
- d. The protection of hydrographic basins and springs;
- e. The promotion of afforestation, reforestation, crop protection, defense and beautification roads, public health and tourism areas;
- f. Coordination with the Ministry of Public Works and Communications in the construction of the communication routes for economic access to forest production areas;
- g. The conservation and increase of the natural resources of hunting and river and lake fishing with the object of obtaining the maximum social benefit;
- h. The study, research and dissemination of forest products; and
- i. Cooperation with national defense.

This law also creates the National Forest Service, dependent on the Ministry of Agriculture and Livestock, with specific powers and attributions: to manage, promote and develop the country's forest resources, in terms of their defense, improvement, expansion and rational use.

For PARACEL the following articles matter:

Article 24. The use of forests will start with prior authorization from the National Forest Service for which purpose the respective application will be submitted accompanied by the corresponding Plan of Forest Management.

Article 25. When the forest production is used in an irrational way, the Forestry authority will encourage the owner to comply with the authorized plan, being able to arrange the suspension of work and cancellation of the permit and apply the corresponding sanctions if the former does not comply with the formulated requirement.

Article 26. The transport and commercialization of wood and other forest products may not be done without the corresponding guides issued by the National Forest Service. These guides will specify: quantity, species, weight or volume, origin and destination of the transported product.

Article 27. Any natural or legal person that is dedicated to the exploitation, industrialization, trade in forest products and reforestation for production purposes, should register in the registries that the National Forest Service will set up for this purpose.

Article 28. The natural or legal persons that carry out forest exploitation must notify the National Forest Service, at the end of each year, the forest area that has been harvested and the volume or weight of the species extracted.

Article 42. All rural properties of more than twenty hectares in forest areas must keep 25 percent of its natural forest area. In case you don't have this minimum percentage, the owner must reforest an area equivalent to five percent of the surface of the property.

Article 43. Cultivated forest areas established on forest lands are declared exempt of the real estate tax under the conditions established by the respective regulations.

Law 3,464/2008 - Creates INFONA

This Law creates the National Forestry Institute, which constitutes the body for the application of the rules established by the Forestry Law and by the Law to promote afforestation and reforestation and also determines that INFONA will have as a general objective the administration, promotion and sustainable development of the country's forest resources, in terms of their defense, improvement, expansion and rational use.

The main functions of INFONA include the following:

- a) Formulate and implement forest policy in accordance with rural government economic and development policies;
- b) Promote and encourage forestry development through the planning, execution and supervision of plans, programs and projects, aimed at fulfilling the aims and objectives of the regulations forestry;
- c) Monitor and control the extraction, industrialization and commercialization of timber products and non-timber trees from the use of the forest until the first transformation of the themselves;
- d) Establish, when appropriate, on a permanent or temporary basis, special regimes of management and protection, with respect to certain areas or forest resources;
- e) Promote and implement education, dissemination and knowledge transfer plans in the forestry disciplines;
- f) Promote public and private investment in activities within the scope of its competence so that increase production, productivity, commercialization, diversification, industrialization of resources forestry, ecotourism and other environmental services;
- g) Set and collect fees and charges for forest use, technical studies, expert opinions and others services;
- h) Manage the forest fund, as well as the goods and facilities that constitute its patrimony;
- i) Design and promote foresting and reforestation plans, forest management, systems agrosilvopastoral, forest restoration and others, which may be financed with own resources or private, national or foreign;

- j) Other attributions that correspond to it, in accordance with Laws No. 422/73 "FOREST" and 536/95 "FOR THE PROMOTION OF FORESTATION AND REFORESTATION";
- k) Prepare the internal regulations of the institution and the matters within its competence;
- l) INFONA will present its budget project annually to the Ministry of Finance, and it will be governed by the laws of State Administration. The Institute will report annually to the Ministry of Agriculture and Livestock on the implementation of forest policy, plans, programs and projects executed as also future projections.

Law 6,676/2020 – Prohibition in the Eastern Region of processing activities and conversion of areas with forest cover

The PARACEL forestry project does not provide for planting in areas in the Eastern region of Paraguay, however the company is aware of the prohibition on the conversion of forest areas determined by this law in its article 4°:

Article 4. a) The realization in the Eastern Region of transformation activities or conversion of areas with forest cover, to areas destined to the agricultural use in any of its forms; or to surfaces intended for human settlements; as well as the production, transportation and commercialization of wood, firewood, charcoal and any forest by-product originated dismantling not allowed.

Resolution SFN 76/1992 – About forest management plans

This regulates the preparation of the forest use and management plans and in its 1st article establish the following limits of forest extension for the elaboration of forest management plans:

- a) The use plans will be drawn up for wooded areas of up to a maximum of 500 hectares.
- b) The management plans will be mandatory for areas greater than 500 hectares and optional for smaller areas.

Article 6 - The Forest Use and Management Plans will contain:

- a) Name and address of the applicant.
- b) Registration number in the Public Forest Registry.
- c) Location and area of the property.
- d) Types of forests and area by stratum and total.
- e) Type of sampling and work methodology.
- f) Total volume per plot for all species with specimens of 10 and more cm. of DAP and its statistical analysis.
- g) Tables of results of the inventory of two entries, classifying trees, basal area and standing commercial volume (up to crown base), referred to the hectare as a unit of surface.

- h) Tables of estimated values of the volume of usable rolls with a diameter equal to or greater than 40 cm., according to species and referred to the hectare.
- i) Cutting plan indicating the maximum volume of cutting per species and annual total, classifying according to diameter classes, per hectare, and for the entire forest.
- j) Inventory field sheets.
- k) Plan of the property and forest area on a topographic chart in scale 1: 50,000.
- l) All the submitted plan sheets must be numbered, stamped and signed by the professional responsible for their preparation.

Law 536/1995 – Encouraging Foresting and Reforesting

This law determines that the State will promote the action of foresting and reforestation in priority forest soils, based on a forest management plan and with some incentives.

These incentives are described in the following:

Article 7. The State will discount by 75% (seventy-five percent) and only once for each foresting or reforested area, the direct costs of the implementation incurred by individuals or legal of any nature and that are carried out in rural properties, whose soils are classified as forest priority.

In the same way, 75% (seventy-five percent) of the direct costs derived from the maintenance of foresting and reforestation during the first 3 (three) years will be reduced, provided that it has been carried out in accordance with the approved Forest Management Plan.

Law 352/1994 and 96/1992 – About protected wild areas and Wild Life

The different properties involved in the Project are located in different ecoregions according to the different visions recognized, for example most of the properties are in the Cerrado while others are found in the Paranaense Province and a small portion of one of the properties in the Chacoan Province.

Concepcion Cerrados are part of the Paraguay Important Bird Area (IBA) 13 and its conservation needs have been highlighted internationally, site that holds different protected areas, neighboring or in the proximity of the properties considered by PARACEL, such as “Serranías San Luis”, “Paso Bravo”, “Parque Nacional Cerro Corá”, “Parque Nacional Bella Vista”, “Arroyo Blanco”, “Cerrado del Rio Apa”, “Guayacan I II II” and “Tagatiyá”.

These areas, as well as their fauna and flora, are part of the National System of Protected Wild Areas and their protection is determined by article 16 of law 352/1994 and by article 4 of law 86/1992:

Article 16.- It will be a permanent objective of the National System of Protected Wild Areas the environmental preservation of extensions of the territory that contain representative samples of landscapes and different biogeographic and ecological regions of the country, in order to maintain biological diversity, ensuring the balance

and continuity of processes evolutionary and ecological, conserve flow and genetic materials and restore degraded systems; are also main objectives:

- a. The management of these areas and their corresponding zones of damping adjusted to the criterion of socio-economic development sustainable;
- b. The preservation and management of hydrographic basins and wetlands; control of erosion and sedimentation;
- c. The protection and management of forest resources, flora and fauna wild;
- d. The protection of cultural heritage, its physical supports, its accesses and its surroundings, as well as the activities promoted by tourism ecological in the right places;
- e. The study, research and ecological dissemination, the development of appropriate technology and environmental education; and
- f. The promotion and encouragement of the interest of society in the preservation and in the management of the Wild Areas representative of the heritage environmental of the country.

Article 4.- The protection, management and conservation of wild life of the country is declared of social interest and public utility, as well as its incorporation into the economy national. All inhabitants have a duty to protect the wildlife of our country.

Law 4,014/2010 - About fire prevention and control

Fires are a risk factor for forest areas and it is necessary to adopt correct measures for the prevention of this.

Article 1. The purpose of this Law is to establish suitable norms to prevent and control rural, forest, vegetation and interface fires; Therefore, the uncontrolled burning of grasslands, forests, bushes, fallows, natural fields, sawdust or any other cereal, legumes or type of flammable organic material that could generate any of the fires defined in this Law is prohibited. The only form of burning authorized for the purposes of this Law is Prescribed Burning.

Article 4.- Created the "Paraguayan Fire Prevention, Monitoring and Control Network" with the following functions:

- c. Establish a National Fire Use Plan and update a public database that will record the variables that make up the sources of fires;

2.1.5 Others

Law 1.183/1985, Civil Code.

The main legal provision applicable to this project concerns the harmful use of property and pollution.

Article 2000 - The proprietor is bound, in the exercise of his right, to abstain from any excess to the detriment of the property of the neighbors. In particular, smoke or soot emissions, harmful and disturbing emanations, noises, vibrations with a harmful effect and exceeding the limits of tolerance due to the local use, the situation and the nature of the buildings are prohibited. The owner, tenant or usufructuary of a property has the right to prevent that the bad use of the neighboring property can harm the security, the peace and the health of the inhabitants.

Depending on the circumstances of the case, the judge may order the cessation of such nuisances and the compensation of damages, even if administrative authorization is required.

(PARAGUAY, Civil Code - 1985)

It is clear that PARACEL must employ mitigation measures to avoid contamination of the Paraguay River.

Law 716/1996 establishes the Ecological Crime and protects the environment against anyone who orders, or through his power authorizes, activity that threatens the balance of the economic system, the support of natural resources or the quality of life. It refers in its articles 7 and 8 to the pollution of the atmosphere and water resources respectively.

The ESIA complies with the legal requirements and principles of Environmental Law, especially the Precautionary Principle.

Law n. 3,966/2010 – Municipal Organizational Law

Article 12 - Duties:

In the field of planning, urbanism and territorial ordering:

- a) The planning of the municipality, through the Sustainable Development Plan of the Municipality and the Urban and Territorial Planning Plan

Environment issues:

- a) The preservation, conservation, recomposition and enhancement of significant natural resources
- b) The regulation and supervision of standards and patterns that guarantee the environmental quality of the municipality; and,

- c) The control of the compliance with national environmental regulations, prior agreement with the competent national authorities.
- d) The normative conditions established by the Municipal Development Plan according to the federal law are made explicit.
- e) In this study and research no specific Municipal Organic Law of the municipality of Concepción was found.
- f) But it is relevant to mention that the next topic covers the Municipal Development Plan of Concepción (Period 2016-2021).

Municipal Development Plan of Concepción (2016 - 2021)

On the website of the Information and Resources Center for Development - CIRD, it is possible to locate the Municipal Development Plan of Concepción mentioned. This document was elaborated from the coordination between authorities and officials of the Departmental and National Governments, with the support of volunteer citizens.

Article 177 of the National Constitution states: "The national development plans shall be indicative for the private sector and mandatory for the public sector".

Thus, there is a context for Sustainable Development Plan of the Municipality that is provided for in Article 225 of the Municipal Organic Law (according to national law n. 3966/2010). This plan must be understood as an instrument of government for local transformation, in a manner consistent with the National Development Plan.

The Municipal Development Plan of Concepción (PDM in Spanish) is a perfectible, dynamic plan that will be updated and improved according to the decisions taken by the Municipal Development Council (formed on June 9, 2016, composed of 29 people).

The PDM points out relevant information that should be evaluated by the PARACEL entrepreneur, especially indicating the population numbers (men and women), educational institutions (urban and rural), health and police establishments, as well as the municipal diagnosis under the social, economic and environmental axes.

Thus, the PDM allows for a diagnosis of Strengths, Opportunities, Weaknesses and Threats in the social, economic and environmental axes.

The Municipal Development objectives include strategies on all three axes:

- social;
- economic; and,
- environment friendly.

The PDM is based on National Constitution, National Development Plan, Law n. 3966/2010 (Municipal Organizational Law) and other legal matters.

However, this document is indicative for private entrepreneurs, PARACEL must comply with the Municipal Development Plan of Concepción, as well as employ the best environmental practices and best available technologies, and all environmental regulations relevant to the preservation, conservation, recomposition and improvement of natural resources. It must also comply with the law that governs the standards and patterns that guarantee the environmental quality of the municipality of Concepción.

The entrepreneur is subject to the Municipal Development Plan and the Organic Law of Concepción. The relationship between PARACEL and the Municipality of Concepción must be subject to the norms on construction and installations, independently of the requirements of the Environmental Impact Study.

This project is subject to all planning and land use regulations of the municipality of Concepción.

Indigenous Protection Regulations

Article 177 of the National Constitution states that "National development plans shall be indicative for the private sector and mandatory for the public sector".

The National Development Plan (PND) was approved by Executive Decree n. 2794/2014, to be applied as a guide in the various tasks that fall under the jurisdiction of the public administration. Based on the aforementioned regulations, the Technical Secretariat for Planning approved a Guide for the elaboration of a Municipal Development Plan that the Municipality of Concepción has respected.

In this context, the Sustainable Development Plan of Concepción (PDM) provided for in Article 225 of Law 3,966/10 "Organic Municipal", shall be interpreted as an instrument of government for change of local reality, in a manner consistent with the vision and objectives of the National Development Plan; since it forms part of a national planning system, by constitutional provision it is governed by the basic guidelines of the same, although nothing prevents it from being strengthened and complemented with other elements that are compatible.

The Constitution of Paraguay (1992) recognizes indigenous peoples and defines them as "groups of culture prior to the formation and organization of the Paraguayan State" (art. 62).

Thus, the Constitution guarantees to indigenous peoples (art. 63) the application of their systems of political, social, economic, cultural and religious organization, as well as their voluntary submission to their customary rules for the regulation of internal coexistence, provided that they do not infringe upon fundamental rights.

Paraguay has adopted national and international standards to protect the fundamental rights of indigenous individuals and communities and provides a framework for the needs and requirements of the administration in the area of access to justice.

In an international, more macro perspective, it is important to cite the main instruments:

- ILO Convention 169; ratified by Law 234/1993;
- United Nations Declaration on the Rights of Indigenous Peoples (2007);
- International Convention on the Elimination of All Forms of Racial Discrimination; in force under law 2,128/2003;
- OAS Declaration on the Rights of Indigenous Peoples (2016).

The same is true at the national level through special laws on indigenous communities. They are as follows:

- Law 904/1981 "Statute of the Indigenous Communities" (modified and extended by Law 919/1996 in articles 30, 31, 62, 63 Inc. d, and 71);
- Law 1,286/2000 "Code of Criminal Procedure", Title VI, articles 432 to 448;

- Law 1,863/2002 "Establishing the Agrarian Statute";
- Act 3231/2007, establishing the General Directorate for Indigenous School Education;
- Law 4,251/2010 "Law on Languages";
- Law 5,469/2015 "On Indigenous Health".

The most important aspect to be considered in this ESIA and for the whole operation of PARACEL is that the indigenous peoples are recognized as groups of culture prior to the formation and organization of the Paraguayan State.

Thus, the Constitution of Paraguay guarantees the right to preserve and develop their ethnic identity and especially to preserve it in their habitat. This means that systems of cultural, social, economic, political and religious organization prevail over systems and jurisdictions legally created by non-indigenous people.

With regard to land ownership, the Magna Carta guarantees sufficient extension and quality to develop their particular way of life.

PARACEL must observe that the removal or relocation of their habitat is prohibited without the express consent of the indigenous peoples and communities. Article 63 states: "The right of indigenous peoples to preserve and develop their ethnic identity in their respective habitat is recognized and guaranteed. They also have the right to freely apply their systems of political, social, economic, cultural and religious organization, as well as to voluntarily submit to their customary rules for the regulation of internal coexistence, provided that they do not violate the fundamental rights established in this Constitution. In jurisdictional disputes, indigenous customary law shall be taken into account".

Therefore, PARACEL must consider indigenous protection in its decision-making, as well as assess the social and environmental impacts that may eventually occur in indigenous communities or peoples, guaranteeing their protection and participation.

2.2 International Standards

2.2.1 Historic Background

In Paraguay according to Decree 954/13 art 1° (with reference to art 2°.b-2) it is mandatory to perform an ESIA to get the government permit for the forest plantation areas, and PARACEL with Pöyry performed this study based on Article 1 to 4 of Law 294/13, which establishes that an Environmental Impact Study is needed for all potential polluted ventures. The impact evaluation investigates the changes in the environment caused by works and/or human activities that have a positive or negative, direct or indirect consequence, affecting life in general, biodiversity, the quality or a significant quantity of natural or environmental resources and their use, welfare, health, personal safety, habits and customs, cultural heritage, legitimate livelihoods.

Thus, the ESIA aims to meet the Financing Institutions of the Project and also that the requirements of the Environmental and social requirements for FSC Certification are fully aligned with IFC's Performance Standards (PS), its EHS Guidelines and the application of best available practices and techniques.

Man's interest in the environment and the issue surrounding it is a matter that goes back many centuries. However, in the second half of the last century, a special global

emphasis has been placed on the issue of environment and development, and it is in this way that the main global, regional and national forums have inevitably turned their attention to seeking appropriate responses and effective solutions, with the aim of "ensuring sustainable human progress and survival".

In 1948, the Constituent Congress of the International Union for the Conservation of Nature, IUCN, was held in Fontainebleau, France, after an international conference of UNESCO.

Later, in 1968, the General Assembly of the United Nations convened a world conference and, as a precedent to this, a meeting of experts was scheduled in Switzerland, which concluded that the quality of life and also life itself was deteriorating in the Third World. These experts formed the so-called Club of Rome, which was originally composed of a multidisciplinary group of economists, politicians and scientists, under the leadership of Dennis Meadows.

The Club of Rome produced a study that caused a great sensation at the time and awoke planetary concern to relate the scarcity of natural resources to the intense exploitation of nature.

The document called "The Limits to Growth" (1972) integrated variables into a global analysis model, presenting conclusions that the environment was threatened by the progressive increase in demand and increase in world population directly related to the decrease in the supply of natural resources (non-renewable resources).

In short, this publication indicates that the decrease in supply is directly related to environmental pollution.

Then, in 1972, the United Nations Conference on Environment and Development met in Stockholm, resulting in the publication of the United Nations Environment Program. The 1972 Stockholm Declaration on the Human Environment supported the Founex Report, and at the same time affirmed the possibility of planning social and economic development without causing irreversible damage to the environment.

Later, in 1987, the Report of the World Commission on the Environment - Our Common Future - presented long-term considerations and strategies for achieving sustainable development and environmental protection. It cannot fail to refer to the Earth Summit (1992, in Brazil) in which the integral and independent nature of the planet was proclaimed and recognized, and which offered a very promising outcome called The Rio Commitments.

These are the main environmental events that consolidated International Environmental Law, which was incorporated by various countries, the same thing happening in Paraguay which assimilated the principles of general application in the discipline of environmental law.

2.2.2 International Treaties and Conventions

Sustainable Development Goals – SDG

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future.

At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

The private sector has an essential role in this process as a great holder of economic power, a propeller of innovations and technologies that influences and engages the most diverse audiences - governments, suppliers, employees and consumers.



Forest Stewardship Council - FSC

Founded in 1994 in response to concerns about global deforestation, the FSC is a pioneering forum, to define what is an environmentally appropriate, socially beneficial, and economically viable management forest management, and to identify tools and resources that promote a positive and lasting change in forests and the peoples that inhabit them.

Through its certification system, the FSC seal recognizes the responsible production of forest products, allowing consumers and companies to make conscious purchasing decisions, benefiting people and the environment, as well as adding value to the business.

The FSC Principles and Criteria are the rules for an environmentally appropriate, socially beneficial, and economically viable management forest management. They form the basis of the FSC certification system and, together with the Preamble and Glossary of Terms, form the core of a comprehensive policy package. There is no hierarchy between the Principles and Criteria, and they are at the center of the FSC standards structure, and should be applied in conjunction with other interconnected documents.

The Principles and Criteria are immutable around the world. Indicators and Verifiers are adapted to each national context and consolidated in National Forest Management Standards. They are used by certifiers to ensure compliance and compliance with P&C.

The 10 principles and the main criteria for PARACEL forestry project are:

- 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 well-being 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 well-being 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.
 - 5.1 The Organization shall identify, produce, or enable the production of, diversified benefits and/or products, based on the range of resources and ecosystem services existing in the Management Unit in order to strengthen and diversify the local economy proportionate to the scale and intensity of management activities.
 - 5.2 The Organization shall normally harvest products and services from the Management Unit at or below a level which can be permanently sustained.
 - 5.3 The Organization shall demonstrate that the positive and negative externalities of operation are included in the management plan.
 - 5.4 The Organization shall use local processing, local services, and local value adding to meet the requirements of The Organization where these are available, proportionate to scale, intensity and risk.
 - 5.5 The Organization shall demonstrate through its planning and expenditures proportionate to scale, intensity and risk, its commitment to long-term economic viability.
- Principle 6 - Environmental values and impact: 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.
 - 6.1 The Organization shall assess environmental values in the Management Unit and those values outside the Management Unit potentially affected by management activities. This assessment shall be undertaken with a level of detail, scale and frequency that is

proportionate to the scale, intensity and risk of management activities, and is sufficient for the purpose of deciding the necessary conservation measures, and for detecting and monitoring possible negative impacts of those activities.

6.2 Prior to the start of site-disturbing activities, The Organization shall identify and assess the scale, intensity and risk of potential impacts of management activities on the identified environmental values.

6.3 The Organization shall identify and implement effective actions to prevent negative impacts of management activities on the environmental values, and to mitigate and repair those that occur, proportionate to the scale, intensity and risk of these impacts.

6.4 The Organization shall protect rare species and threatened species and their habitats in the Management Unit through conservation zones, protection areas, connectivity and/or (where necessary) other direct measures for their survival and viability. These measures shall be proportionate to the scale, intensity and risk of management activities and to the conservation status and ecological requirements of the rare and threatened species. The Organization shall take into account the geographic range and ecological requirements of rare and threatened species beyond the boundary of the Management Unit, when determining the measures to be taken inside the Management Unit.

6.5 The Organization shall identify and protect representative sample areas of native ecosystems and/or restore them to more natural conditions. Where representative sample areas do not exist or are insufficient, The Organization shall restore a proportion of the Management Unit to more natural conditions. The size of the areas and the measures taken for their protection or restoration, including within plantations, shall be proportionate to the conservation status and value of the ecosystems at the landscape level, and the scale, intensity and risk of management activities.

6.6 The Organization shall effectively maintain the continued existence of naturally occurring native species and genotypes, and prevent losses of biological diversity, especially through habitat management in the Management Unit. The Organization shall demonstrate that effective measures are in place to manage and control hunting, fishing, trapping and collecting.

6.7 The Organization shall protect or restore natural water courses, water bodies, riparian zones and their connectivity. The Organization shall avoid negative impacts on water quality and quantity and mitigate and remedy those that occur.

6.8 The Organization shall manage the landscape in the Management Unit to maintain and/or restore a varying mosaic of species, sizes, ages, spatial scales and regeneration cycles appropriate for the landscape values in that region, and for enhancing environmental and economic resilience.

6.9 The Organization shall not convert natural forest to plantations, nor natural forests or plantations on sites directly converted from natural forest to non-forest land use, except when the conversion:

- a. affects a very limited portion of the area of the Management Unit, and
- b. will produce clear, substantial, additional, secure long-term conservation benefits in the Management Unit, and
- c. does not damage or threaten High Conservation Values, nor any sites or resources necessary to maintain or enhance those High Conservation Values.

6.10 Management Units containing plantations that were established on areas converted from natural forest after November 1994 shall not qualify for certification, except where:

- a. clear and sufficient evidence is provided that The Organization was not directly or indirectly responsible for the conversion, or
- b. the conversion affected a very limited portion of the area of the Management Unit and is producing clear, substantial, additional, secure long term conservation benefits in the Management Unit.

- 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.

7.1 The Organization shall, proportionate to scale, intensity and risk of its management activities, set policies (visions and values) and objectives for management, which environmentally appropriate, socially beneficial, and economically viable. Summaries of these policies and objectives shall be incorporated into the management plan, and publicized.

7.2 The Organization shall have and implement a management plan for the Management Unit which is fully consistent with the policies and objectives as established according to Criterion 7.1.

The management plan shall describe the natural resources that exist in the Management Unit and explain how the plan will meet the FSC certification requirements. The management plan shall cover forest management planning and social management planning proportionate to scale, intensity and risk of the planned activities.

7.3 The management plan shall include verifiable targets by which progress towards each of the prescribed management objectives can be assessed.

7.4 The Organization shall update and revise periodically the management planning and procedural documentation to incorporate the

results of monitoring and evaluation, stakeholder engagement or new scientific and technical information, as well as to respond to changing environmental, social and economic circumstances.

7.5 The Organization shall make publicly available a summary of the management plan free of charge. Excluding confidential information, other relevant components of the management plan shall be made available to affected stakeholders on request, and at cost of reproduction and handling.

7.6 The Organization shall, proportionate to scale, intensity and risk of management activities, proactively and transparently engage affected stakeholders in its management planning and monitoring processes, and shall engage interested stakeholders on request.

- 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

FSC also has a certificate of Controlled Wood. This standard specifies basic requirements applicable at the forest management unit (FMU) level for forest management enterprises to demonstrate to a company or third party certification body that wood supplied is controlled.

It allows forest management projects to provide evidence that the wood they supply has been controlled to avoid wood that is illegally harvested, harvested in violation of traditional and civil rights, harvested in forest management units in which high conservation values are threatened by management activities, harvested in areas in which forests are being converted to plantations or nonforest use or harvested from forests in which genetically modified trees are planted:

- 1.4. The Forest Management Enterprise shall include the following information on all invoices issued for sales of FSC Controlled Wood products:
 - a. the name and address of the buyer;
 - b. the date on which the invoice was issued;
 - c. description of the product;
 - d. the quantity of the products sold;
 - e. reference to the product's batch and/or to related shipping documentation,
 - f. sufficient to link the invoice to the goods received by the customer;
 - g. the certification code issued by an FSC accredited Certification Body.

- 1.5. Invoices and shipping documents for sale of controlled wood shall always include the claim “FSC Controlled Wood”. Where sale or transport documents cover a consignment of both controlled and uncontrolled wood it shall specify which products are sold or transported as “FSC Controlled Wood”.
- 1.6. The Forest Management Enterprise shall ensure that claims in relation to FSC Controlled Wood meet the requirements specified in appendix 3 of this standard.
- 2.1. The Forest Management Enterprise shall specify the Forest Management Units (FMUs) under its management.
- 2.2. The Forest Management Enterprise shall specify the FMUs to be included in the scope of evaluation for compliance with this standard.
- 2.3. Any FMU under the control of the Forest Management Enterprise is not included in the scope of evaluation for compliance with this standard, then the Forest Management Enterprise shall implement a tracking system to ensure wood from FMUs included in the scope of the standard to be reliably identified as such.

The HCS Approach Toolkit

Tropical natural forests hold large stores of carbon and biodiversity, and are critical for millions of indigenous and local peoples who depend on forests for their livelihoods. However, this carbon is released and biodiversity is lost when these forests are cleared – otherwise known as deforestation. The High Carbon Stock (HCS) Approach is a methodology that distinguishes forest areas for protection from degraded lands with low carbon and biodiversity values that may be developed. The methodology was developed with the aim to ensure a practical, transparent, robust, and scientifically credible approach that is widely accepted to implement commitments to halt deforestation in the tropics, while ensuring the rights and livelihoods of local peoples are respected.

The amount of carbon and biodiversity stored within an area of land varies according to the type of vegetative cover. The HCS Approach stratifies the vegetation in an area of land into six different classes using analyses of satellite data and ground survey measurements. These six classes are: High Density Forest, Medium Density Forest, Low Density Forest, Young Regenerating Forest, Scrub, and Cleared/ Open Land. The first four classes are considered potential High Carbon Stock forests.

The HCS Approach is a breakthrough for plantation companies and manufacturers who are committed to breaking the link between deforestation and land development in their operations and supply chains. The approach represents the first practical methodology that has been tested and developed in active concessions in Asia and Africa with input from a variety of stakeholders. It is a relatively simple tool that plantation companies can use for new developments while ensuring that forests are protected from conversion.

PARACEL’s forest project plans to use only pastureland as plantations and the wooded areas will be retained and protected.

Voluntary Principles on Security and Human Rights Security and Human Rights

The Voluntary Principles on Security and Human Rights were created in 2000 when the governments of the United States and the United Kingdom, companies, and NGOs engaged in a dialogue about security and human rights. Although originally developed for the extractive and energy sector, the principles are implemented by a variety of industries.

While the duty to protect human rights rests with governments, businesses have a responsibility to avoid harming people and to address adverse impacts with which they are involved. Companies often operate in complex environments with little guidance on the ground on how to observe their human rights responsibilities. The Voluntary Principles helps companies understand the environment they are operating in, identify security-related human rights risks, and take meaningful steps to address them.

Through dialogue and a collective effort, the participants have developed a set of voluntary principles that fall into three components:

- **Risk Assessment:** The ability to assess risks in a Company's operating environment and impact to local communities is critical. The quality of risk assessment depends on the assembling of updated, credible information from a range of perspectives — governments, security firms, other companies, multilateral institutions, and civil society. Some of the factors that should be considered are:
 - ✓ Identification of risks associated with political, economic, civil or social factors.
 - ✓ Potential for violence.
 - ✓ Human rights records of public security forces, paramilitaries, law enforcement, and private security.
 - ✓ Local prosecuting authority and judiciary's capacity to ensure accountability.
 - ✓ Conflict analysis with identification of the root causes of conflicts and level of adherence to human rights standards.
 - ✓ Risks associated with the transfer of lethal and non-lethal equipment to security providers.
- **Interactions Between Companies and Public Security:** Although governments have the primary role of maintaining law and order, companies have an interest in ensuring that actions taken by public security providers are consistent with the protection of human rights. Some of the principles that guide relationships between companies and public security providers are:
 - ✓ Companies should consult with governments and communities about the impact of their security arrangements.
 - ✓ The type of forces deployed should be proportional to the threat.
 - ✓ Individuals implicated in human rights abuses should not provide security services.
 - ✓ Force is used only when necessary.

- ✓ Companies should hold frequent meetings with public security and other stakeholders.
 - ✓ Companies should provide human rights training.
 - ✓ Allegations of human rights abuses should be reported.
 - ✓ Information used for allegations of human rights abuses should be credible.
- Interactions Between Companies and Private Security: The following represents some of the principles to guide private security conduct.
- ✓ Private security should act consistently with the law and international guidelines. They should have policies regarding appropriate conduct and the use of force.
 - ✓ Allegations of human rights abuses should be investigated and monitored.
 - ✓ Only preventative and defensive services should be provided.
 - ✓ Individuals implicated in human rights abuses should not provide security services.
 - ✓ Private security should investigate and report incidents where physical force is used.
 - ✓ Companies should include the Voluntary Principles in their contract agreements with private security providers and ensure personnel is trained.
 - ✓ Companies should seek to employ private security providers from the local population.
 - ✓ Companies should exchange information with other stakeholders about abuses committed by private security

UN Guiding Principles on Business and Human Rights – UNGPs

These Guiding Principles are grounded in recognition of:

- a) States' existing obligations to respect, protect and fulfil human rights and fundamental freedoms;
- b) The role of business enterprises as specialized organs of society performing specialized functions, required to comply with all applicable laws and to respect human rights;
- c) The need for rights and obligations to be matched to appropriate and effective remedies when breached.

These Guiding Principles apply to all States and to all business enterprises, both transnational and others, regardless of their size, sector, location, ownership and structure.

The UN Framework also addresses the human rights responsibilities of businesses. Business enterprises have the responsibility to respect human rights wherever they operate and whatever their size or industry. This responsibility means companies must know their actual or potential impacts, prevent and mitigate abuses, and address adverse

impacts with which they are involved. In other words, companies must know—and show—that they respect human rights in all their operations.

The Guiding Principles contain three chapters, or pillars: protect, respect and remedy. Each defines concrete, actionable steps for governments and companies to meet their respective duties and responsibilities to prevent human rights abuses in company operations and provide remedies if such abuses take place.

- The State duty to protect human rights: States must protect against human rights abuse within their territory and/or jurisdiction by third parties, including business enterprises. This requires taking appropriate steps to prevent, investigate, punish and redress such abuse through effective policies, legislation, regulations and adjudication.

States should set out clearly the expectation that all business enterprises domiciled in their territory and/or jurisdiction respect human rights throughout their operations.

- The corporate responsibility to respect human rights: Business enterprises should respect human rights. This means that they should avoid infringing on the human rights of others and should address adverse human rights impacts with which they are involved.

The responsibility of business enterprises to respect human rights refers to internationally recognized human rights – understood, at a minimum, as those expressed in the International Bill of Human Rights and the principles concerning fundamental rights set out in the International Labour Organization’s Declaration on Fundamental Principles and Rights at Work.

The responsibility to respect human rights requires that business enterprises:

- a) Avoid causing or contributing to adverse human rights impacts through their own activities, and address such impacts when they occur;
- b) Seek to prevent or mitigate adverse human rights impacts that are directly linked to their operations, products or services by their business relationships, even if they have not contributed to those impacts.

The responsibility of business enterprises to respect human rights applies to all enterprises regardless of their size, sector, operational context, ownership and structure. Nevertheless, the scale and complexity of the means through which enterprises meet that responsibility may vary according to these factors and with the severity of the enterprise’s adverse human rights impacts.

In order to meet their responsibility to respect human rights, business enterprises should have in place policies and processes appropriate to their size and circumstances, including:

- a) A policy commitment to meet their responsibility to respect human rights;
- b) A human rights due diligence process to identify, prevent, mitigate and account for how they address their impacts on human rights;
- c) Processes to enable the remediation of any adverse human rights impacts they cause or to which they contribute.

- Access to remedy: As part of their duty to protect against business-related human rights abuse, States must take appropriate steps to ensure, through judicial, administrative, legislative or other appropriate means, that when such abuses occur within their territory and/or jurisdiction those affected have access to effective remedy.

2.2.3 Detailed International Lender Standards

International Finance Corporation – IFC

IFC's Environmental and Social Performance Standards define IFC clients' responsibilities for managing their environmental and social risks.

The 2012 edition of IFC's Sustainability Framework, which includes the Performance Standards, applies to all investment and advisory clients whose projects go through IFC's initial credit review process after January 1, 2012.

IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. The Performance Standards may also be applied by other financial institutions.

2. Together, the eight Performance Standards establish standards that the client is to meet throughout the life of an investment by IFC:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts: underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders. Drawing on the elements of the established business management process of “plan, do, check, and act,” the ESMS entails a methodological approach to managing environmental and social risks and impacts in a structured way on an ongoing basis. A good ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance, and can lead to improved financial, social, and environmental outcomes
- Performance Standard 2: Labor and Working Conditions: recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention, and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, clients may create tangible benefits, such as enhancement of the efficiency and productivity of their operations.
- Performance Standard 3: Resource Efficiency and Pollution Prevention: recognizes that increased economic activity and urbanization often generate

increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world. These are often implemented through continuous improvement methodologies similar to those used to enhance quality or productivity, which are generally well known to most industrial, agricultural, and service sector companies.

- Performance Standard 4: Community Health, Safety, and Security Performance: recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, this Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.
- Standard 5: Land Acquisition and Involuntary Resettlement Performance: recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement. This occurs in cases of (i) lawful expropriation or temporary or permanent restrictions on land use and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.
- Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources: recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.”
- Performance Standard 7: Indigenous Peoples: recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in,

lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases.

- Performance Standard 8: Cultural Heritage: recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector, EBRD, CDC, IFC

Jointly commissioned by IFC, the European Bank for Reconstruction and Development (EBRD), and CDC Group, Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector outlines emerging practices in addressing gender-based violence and harassment (GBVH) in operations and investments. These practices are drawn from recent experience in the private sector, as well as a larger body of work from the non-profit sector. The guidance provides an opportunity to engage with stakeholders to refine practices as those in the private sector collectively gain implementation experience.

The negative impacts of GBVH on both individual health and wellbeing and businesses can be severe. For companies and investors, GBVH can pose a range of risks, including costly litigation, loss of profits and damaged reputation.

The following principles need to underpin all efforts to assess, prevent, respond to and monitor GBVH.

- Survivor-centered: Prioritize the rights and needs of people who have experienced GBVH and listen to their wishes.
- Safe: Protect people who experience, witness or report GBVH, as well as those who seek to address it.
- Context-specific: Base all actions on a solid understanding of the local legal and social context.
- Collaborative: Work with internal and external stakeholders to identify risks, prevent GBVH and respond to reports.
- Inclusive: Address the heightened risk of GBVH for certain groups and provide access to independent, objective and nonjudgmental spaces to discuss concerns.
- Integrated: Address GBVH as part of an organization's existing processes and management systems.

- Non-discriminatory: Locate efforts to address GBVH as part of wider approaches to promote inclusive, diverse and effective businesses.
- Well-informed: Draw on expertise, including from GBVH, child protection and legal experts when needed, to help inform approaches and support responses.

It is important that companies and investors recognize that the stakes can be extremely high or even life-threatening for those who speak out against GBVH. Continuous thought, care and sensitivity are needed.

Investors and companies can take action to prevent GBVH and to be ready to respond to reports. It is often easier and more effective to integrate measures into existing systems by:

- strengthening leadership and company culture, so that GBVH risks are understood, clear and consistent messages are communicated, necessary partnerships are developed, inclusive organizational structures are developed, and adequate resources are invested
- developing and communicating policies and codes of conduct that define GBVH, set out prevention and response measures and outline behaviors that are not tolerated, with clear links to sanctions and disciplinary procedures
- establishing grievance mechanisms and investigation procedures that enable GBVH to be reported in a safe and confidential way, with effective channels at project level and for workers, service users and communities
- strengthening recruitment and performance assessments so that they address GBVH risks and enable fair and transparent decision-making on hiring, promotions and performance-related pay
- delivering training and awareness raising, both internally among workers and externally among communities and service users, providing essential information and enhanced training for those with specific responsibilities for GBVH prevention and response
- working with contractors and suppliers to address GBVH through procurement processes, contract selection and negotiation and regular engagement along the supply chain
- improving the physical design of worksites and service delivery locations, with safety assessments to identify potential GBVH hotspots for workers, service users and community members.

IFC's Workers' Accommodation: Processes and Standards

This guidance note addresses the processes and standards that should be applied to the provision of workers' accommodation in relation to projects funded by the European Bank for Reconstruction and Development (EBRD) or IFC. Applying appropriate standards to the construction and operation of worker housing falls within the performance requirements on labor issues expected of clients by both organizations.

There is a range of different types of workers' accommodation that may be required by various projects and at different stages within projects, including temporary exploration camps, construction camps and permanent dormitories. Specific issues arise in relation to each of these.

The key standards that need to be taken into consideration, as a baseline, are those contained in national/local regulations. Although it is quite unusual to find regulations specifically covering workers' accommodation, there may well be general construction standards which will be relevant. These may include the following standards:

- Building construction: for example, quality of material, construction methods, resistance to earthquakes.
- Housing and public housing: in some countries regulations for housing and public housing contain requirements on issues such as the basic amenities, and standards of repair.
- General health, safety and security: requirements on health and safety are often an important part of building standards and might include provisions on occupation density, minimal air volumes, ventilation, the quality of the flooring (slip-resistant) or security against intrusion.
- Fire safety: requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and emergency exits, restrictions on the use of certain building materials.
- Electricity, plumbing, water and sanitation: national design and construction standards often include very detailed provisions on electricity or plumbing fixtures/fittings, water and sanitation connection/ equipment.

IFC Environmental, Health, and Safety Guidelines for Perennial Crop Production

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards.

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in plantations by existing technology at reasonable costs. Application of the EHS Guidelines to existing farming and forestry systems may involve the establishment of site-specific targets, with an appropriate timetable for achieving them.

The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables— such as host country context, assimilative capacity of the environment, and other project factors—are taken into account.

Environmental issues in plantation crop production primarily include the following:

- Soil Conservation and Management
- Nutrient Management
- Crop Residue and Solid Waste Management
- Water Management
- Pest Management

- Use and Management of Pesticides
- Fertilizers
- Biodiversity and Ecosystems
- Genetically Modified Crops (GM Crops)
- Energy Use
- Air Quality
- Greenhouse Gas (GHG) Emissions

IFC Environmental, Health, and Safety Guidelines for Forest Harvesting Operations

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors.

The EHS Guidelines for Forest Harvesting Operations include information relevant to the management of both plantation and natural forests, in temperate, boreal and tropical zones.

Market demands that forest products originate from sustainably managed natural and plantation forest operations have resulted in the creation of specific forest certification systems to demonstrate that internationally-acceptable standards of forest management are met.

These systems generally have formal standards, based on internationally-acceptable principles and criteria for sustainable forest management, and usually include the following:

- Compliance with relevant law;
- Respect for any customary land tenure and use rights of indigenous peoples respect for the rights of workers, and compliance with occupational health and safety measures;
- Measures for community and stakeholder engagement
- Conservation of biodiversity and protection of critical habitat;
- Maintenance of environmentally-sound multiple benefits from the forest;
- Prevention or minimization of adverse environmental and social impacts;
- Effective forest management planning;
- Active monitoring and assessment of relevant forest management areas.

Forest sector enterprises may be encouraged or required by regulatory bodies or financial institutions, to obtain such certification as a condition of operation, and such certification is also increasingly being viewed as necessary for access to international or national markets.

Environmental issues in forest harvesting operations primarily include the following:

- Habitat alteration and loss of biodiversity
- Water quality
- Soil productivity
- Hazardous materials management
- Visual impact

IDB Invest Environmental and Social Sustainability Policy

IDB Invest, the private sector institution of the Inter-American Development Bank (IDB) Group, is a multilateral development bank committed to supporting the private sector in Latin America and the Caribbean. It finances sustainable enterprises and projects to achieve financial results that maximize economic, social and environmental development for the region.

In addition to the policies approved by the IDB Invest Board, the Sustainability Policy requires clients to apply the IFC Performance Standards and the World Bank Group's EHS Guidelines. The Sustainability Policy highlights IDB Invest commitments in several areas, both environmental and social. Topics that are given increased emphasis include disaster risk management, human rights, stakeholder engagement, gender and diversity, and reprisals.

DFC's Environmental and Social Policies and Procedures - ESPP

U.S. International Development Finance Corporation (DFC) is America's development bank. DFC partners with the private sector to finance solutions to the most critical challenges facing the developing world today. DFC invests across sectors including energy, healthcare, critical infrastructure, and technology projects. DFC also provides financing for small businesses and women entrepreneurs in order to create jobs in emerging markets. DFC investments adhere to high standards and respect the environment, human rights, and worker rights.

The guiding environmental and social policies and procedures are based in large part on environmental and social impact assessment procedures applied by organizations such as the World Bank Group, the European Bank for Reconstruction and Development, the Inter-American Development Bank, and the U.S. Export Import Bank, among others.

DFC's business lines work closely with the Office of Development Policy to determine a project's eligibility for DFC support. Each potential project is subject to a full policy review. Thorough, accurate, and complete information in the application and supplemental materials, such as a business plan, help expedite DFC's project review.

All projects and Subprojects are categorized as Category A, B, C or D based on environmental and social factors. PARACEL's forest project is classified in Category A that are projects that may have significant adverse environmental and/or social impacts that are irreversible, sensitive, diverse, or unprecedented in the absence of adequate mitigation measures. Category A projects are considered high risk.

Companies must meet the requirements of the IFC's Performance Standards. Included within this requirement are the risk and impact identification requirements of Performance Standard 2, which requires (1) Identification of all relevant environmental and social risks of the Project including issues identified in Performance Standards

through 8; (2) Identification of all factors that define the Project's Area of Influence; and (3) Identification of groups and communities that may be directly or indirectly affected by the Project (i.e., Project Affected People), including groups and communities that may be differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status. The process of identifying risks, impacts, Area of Influence and Project Affected People shall be adequate, accurate, objective and appropriate to the severity of Project risks and significance of Project impacts.

All projects involving timber extraction from Natural Forests, including all boreal, temperate, and plantation Forests must be, and remain, certified by an independent non-governmental organization.

Certifiers must be accredited by an international accreditation body (such as the Forest Stewardship Council that can hold the certifier accountable to a common set of environmental and social principles and procedural protocols, including periodic review and re-accreditation. The purpose of certification is to demonstrate that timber extraction activities are managed sustainably.

Any forest product labeling associated with a certified Forest must be guaranteed by a credible independent certification body that connects the labeled product to its certified forest- of-origin.

Equator Principles

As financiers and advisors, Equator Principles Financial Institutions (EPFIs) work in partnership with its clients to identify, assess and manage environmental and social risks and impacts in a structured way, and on an ongoing basis. Such collaboration promotes sustainable environmental and social performance and can lead to improved financial, environmental and social outcomes.

The Equator Principles are intended to serve as a common baseline and framework for financial institutions to identify, assess and manage environmental and social risks when financing Projects.

The Equator Principles apply globally and to all industry sectors. The principles are:

- Principle 1: Review and Categorization: When a Project is proposed for financing, the EPFI will, as part of its internal environmental and social review and due diligence, categorize the Project based on the magnitude of potential environmental and social risks and impacts, including those related to Human Rights, climate change, and biodiversity. Such categorization is based on the International Finance Corporation's (IFC) environmental and social categorization process. This categorization is the same of DFC's Environmental and Social Policies and Procedures – ESPP and PARACELS's forest project is classified as Category A.
- Principle 2: Environmental and Social Assessment: The EPFI will require the client to conduct an appropriate Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and scale of impacts of the proposed Project. The Assessment Documentation should propose measures to minimize, mitigate, and where residual impacts remain, to compensate/offset/remedy for risks and impacts to Workers, Affected

Communities, and the environment, in a manner relevant and appropriate to the nature and scale of the proposed Project.

- Principle 3: Applicable Environmental and Social Standards: The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan: For all Category A and Category B Projects the EPFI will require the client to develop and / or maintain an Environmental and Social Management System (ESMS).
- Principle 5: Stakeholder Engagement: For all Category A and Category B Projects the EPFI will require the client to demonstrate effective Stakeholder Engagement, as an ongoing process in a structured and culturally appropriate manner, with Affected Communities, Workers and, where relevant, Other Stakeholders.
- Principle 6: Grievance Mechanism: For all Category A the EPFI will require the client, as part of the ESMS, to establish effective grievance mechanisms which are designed for use by Affected Communities and Workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.
- Principle 7: Independent Review: For all Category A an Independent Environmental and Social Consultant, will carry out an Independent Review of the Assessment process including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence and determination of Equator Principles compliance. The Independent Environmental and Social Consultant will also propose or opine on a suitable EPAP capable of bringing the Project into compliance with the Equator Principles, or indicate where there is a justified deviation from the applicable standards. The Independent Environmental and Social Consultant must be able to demonstrate expertise in evaluating the types of environmental and social risks and impacts relevant to the Project.
- Principle 8: Covenants: For all Projects, where a client is not in compliance with its environmental and social covenants, the EPFI will work with the client on remedial actions to bring the Project back into compliance. If the client fails to re-establish compliance within an agreed grace period, the EPFI reserves the right to exercise remedies, including calling an event of default, as considered appropriate.
- Principle 9: Independent Monitoring and Reporting: For all Category A in order to assess Project compliance with the Equator Principles after Financial Close and over the life of the loan, the EPFI will require independent monitoring and reporting. Monitoring and reporting should be provided by an Independent Environmental and Social Consultant.
- Principle 10: Reporting and Transparency: For all Category A:
 - ✓ The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online and that it includes a summary of Human Rights and climate change risks and impacts when relevant.

- ✓ The client will report publicly, on an annual basis, GHG emission levels (combined Scope 1 and Scope 2 Emissions, and, if appropriate, the GHG efficiency ratio¹²) during the operational phase for Projects emitting over 100,000 tonnes of CO₂ equivalent annually.
- ✓ The EPFI will encourage the client to share commercially non-sensitive Project-specific biodiversity data with the Global Biodiversity Information Facility¹³ (GBIF) and relevant national and global data repositories, using formats and conditions to enable such data to be accessed and re-used in future decisions and research applications.

3 DESCRIPTION OF PROJECT

3.1 Plantation Operations and Locations

PARACEL will acquire an area of approximately 190 thousand ha. The properties are reportedly on average 47% of Quite Natural Area (i.e. non-plantable) and 53 % of Modified Area (i.e. potentially plantable). Reportedly, that mainly pasturelands will be used as plantations, and the native forest and riparian areas will be retained and protected, which will amount to roughly 90 thousand hectares of conservation areas.

The PARACEL plantations range between 30 km and 150 km from the mill site.

The main purpose of these plantations is to provide wood to the pulp mill which is schedule to start operating in 2023.

The areas to be acquired by PARACEL will be managed by them and that are covered by this study are divided in 19 properties and are located on the regions of Concepción and Amambay, as per following figure and table.

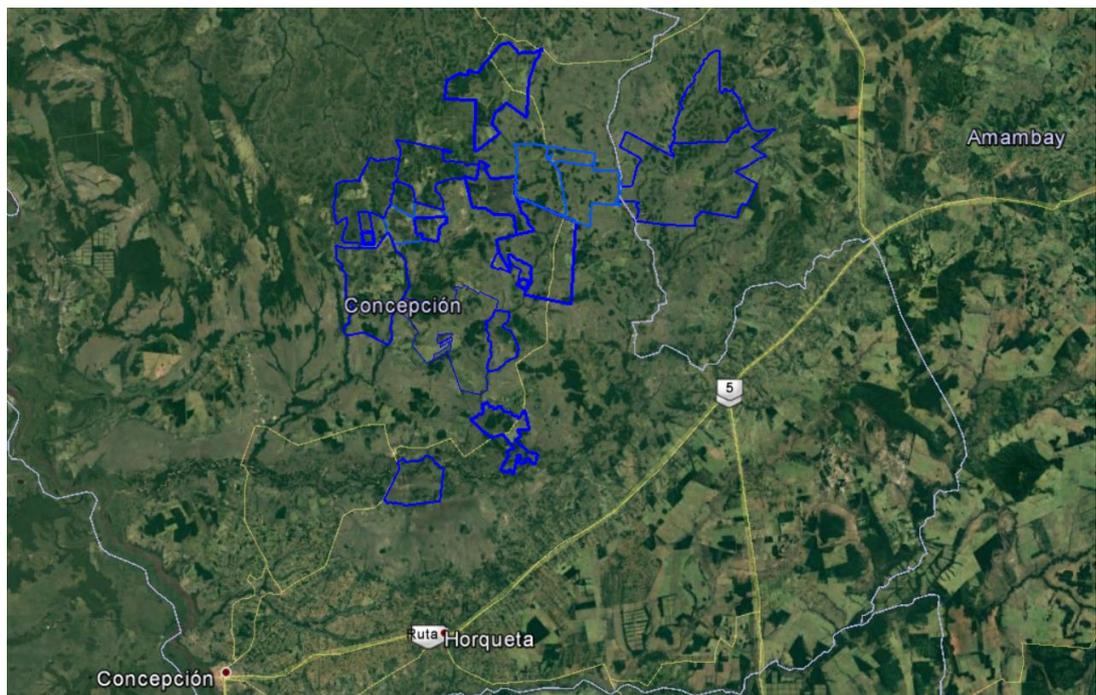


Figure 1 – Location of Forest Properties. Source: Google Earth, 2021.

Table 1 – Forest Properties

Abbrev.	Properties	Department	District	Surface (ha)
CR	Cristo Rey	Concepción	Loreto	6.747
GA	Gavilán	Concepción	Sgto. José Félix López	6.722
HE	Hermosa	Concepción	Sgto. José Félix López	14.978
IA	Isla Alta	Concepción	Concepción	556
LB	La Blanca	Concepción	Concepción	5.632
LP	La Paraguaya	Concepción	Sgto. José Félix López	4.221
MC	Machuca Cué	Concepción	Sgto. José Félix López	1.720
MN	Mandijú	Concepción	Concepción	4.074
RZ	Rancho Z	Concepción	Concepción	19.345
RO	Ronaldo	Concepción	Sgto. José Félix López	711
SL	San Liberato	Concepción	Sgto. José Félix López	18.502
ST	Santa Teresa	Amambay	Bella Vista	31.453
SI	Silva	Concepción	Concepción	1.210
SO	Soledad	Concepción	Sgto. José Félix López	10.115
TM	Trementina	Concepción	Sgto. José Félix López-Concepción	17.095
VS	Villa Sana	Concepción	Sgto. José Félix López-Concepción	17.179
WI	Willer	Concepción	Sgto. José Félix López	412
ZM	Zanja Moroti	Concepción	Sgto. José Félix López	11.213
ZA	Zapallo	Amambay	Bella Vista	12.889
TOTAL				184.774

Source: PARACEL, 2021.

3.2 History and status of the acquisition of the 20 estancias

Paracel's journey began with two companies, independent of each other, located on different continents, but sharing the same vision: to have a positive impact on society and to encourage an increase in demand for biodegradable products.

The Zapag group is a Paraguayan leader in the import and distribution of fuel. Always attentive to global and regional trends, the group saw an opportunity in the growth of products derived from pulp and decided to acquire land that was destined for forestation. The choice of these lands was made considering factors such as degraded land, soil suitability and good conditions for biological growth, logistics; and the possibility of providing work to thousands of people in the region.

Meanwhile, Girindus Investments is a group of companies based in Sweden, which has extensive experience in the research and development of the pulp business throughout its production chain: from sustainable forestation to producing pulp. In the search to expand the business in a competitive environment, Girindus was interested in participating in the development of a new project that met all criteria for a state-of-the-art sustainable pulp mill.

In this way, the combination of the vision of Zapag group and Girindus led to the creation of Paracel, a company that aims to build a world-class pulp mill in the Concepción region of Paraguay, through compliance with the highest sustainability standards and one of the most efficient logistics for regional and global markets.

Therefore, Paracel project was born with already some forest lands acquired. After that Paracel acquired some plantations areas from a company named EUCATEC S.A. In total 20 estancias were acquired, being 19 for eucalyptus plantation and 1 for the pulp mill site.

It should be noted that within Forestry Master Plan, Paracel counts with the land module which aims to allow the control of land acquisitions and leases made by the company. This includes stakeholders (broker, attorney, buyer, and sellers), payment control made individually for each of the sellers or lessees, and the control of the properties purchased or leased in each acquisition always prioritizing none people displacement.

3.3 Nurseries

PARACEL will contract nursery services to local producers, attending to the requirements of quality and technology in partnership with private nurseries. The PARACEL nursery project will be contracted in 2022. Currently, 100% of the seedlings used in the plantations are purchased from third parties. The purchase contract establishes the delivery standard for the seedlings.

3.4 Plantations

The eucalyptus varieties that PARACEL will require 6 years of growth prior to harvest (a 6-year rotation), with initial density varying from 1,200 to 2,300 seedlings per hectare. The ideal annual precipitation range is 1,000 – 1,400 millimeters (mm) with the precipitation occurring for eight months of the year.

Once in full production the PARACEL owned plantations are expected to provide around 80 percent of the PARACEL mill's raw material needs, while 20 percent will come from local out-growers in Paraguay.

PARACEL plans to achieve FSC certification for all PARACEL owned plantations.

3.4.1 Soils

The forest project area and its direct influence zones are located according to the land use classification map below.

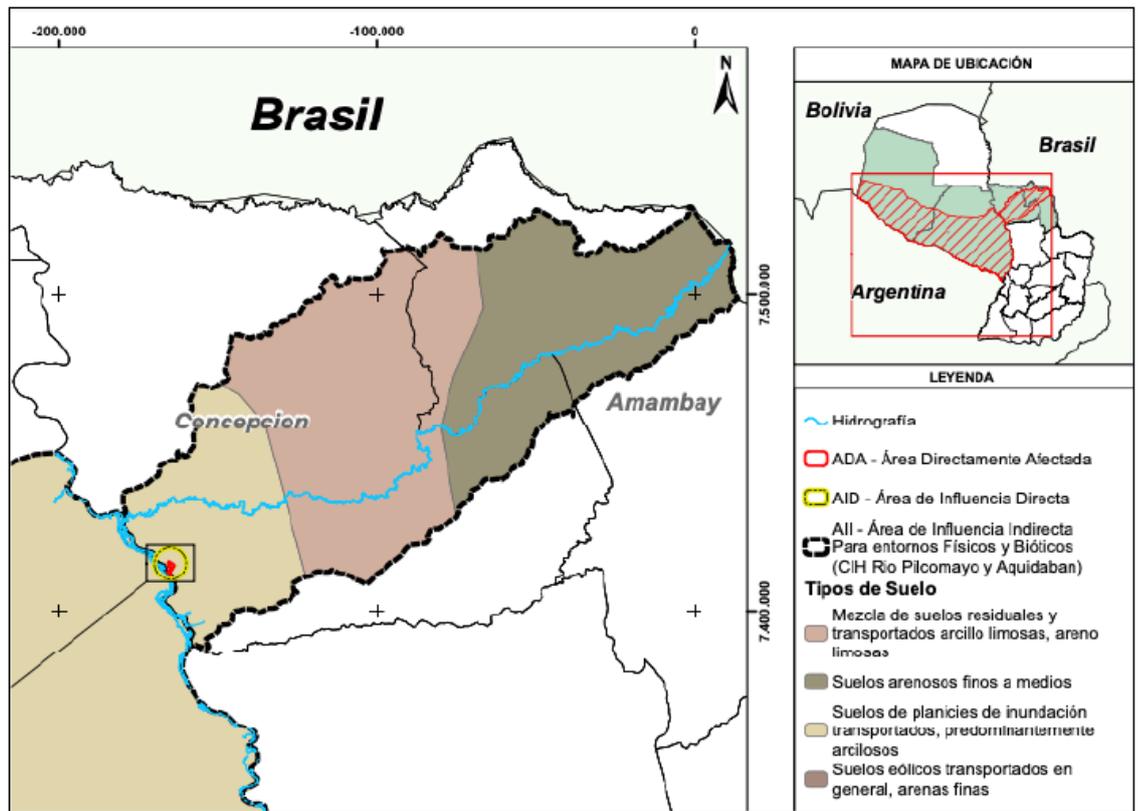


Figure 2 – Soil classification in the direct influence zone. Source: Pöyry

According to the classification of the land use capacity in Paraguay, PARACEL’s forest areas are located in a region with predominance of Class VI soils (Figure 5).

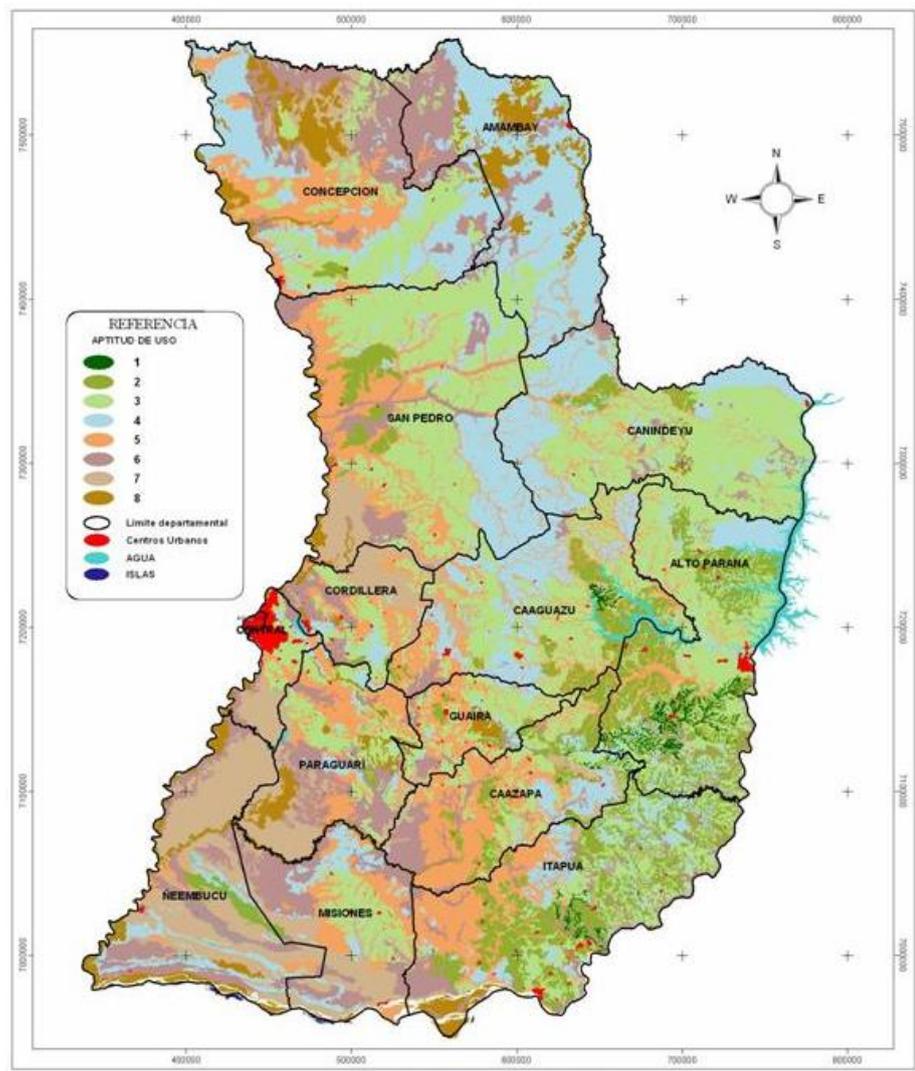


Figure 3 – Land use capacity in Paraguay. Source: Project of Rationalization of Land Use (PRUT)

These areas present inappropriate conditions to develop agricultural crops according to the department of soils from Paraguay. However, such areas are suited for forest plantations as forests are less demanding regard soils fertility and more resilient than agricultural crops.

3.4.1.1 Monitoring and Maintenance of Soil Fertility

Before each rotation, samples of the soil are taken to analyze the current deficiencies in terms of fertility. These results are used for the fertilization recommendations (quantities and time and sharing of application). With that, each soil unit has its own treatment.

For the first forest establishment, a first soil sampling must be carried out in order to identify the different types of soil in the farm. This activity happens only once, as the type of soil will not change over time, and this information will be used as an input to fertilization recommendation and management and conservation actions.

3.4.1.2 Erosion Control

The erosion management must be preventive, through soil conservation measures from the first establishment, aiming to avoid the start of erosive processes. Through this process, all soil preparation activities are reduced to a minimum, in order to avoid soil exposure. The preparation is done only on planting rows, and on steepest areas it is carried out perpendicular to the slope, seeking to avoid damages due to rainwater flow.

Erosion prevention actions must focus on the first years of plantation, when the soil is more exposed and susceptible to erosive processes. After a certain age, the canopy closes and helps reducing the impact of rainwater.

Some measures, however, must can be carried out during the whole planting cycle, in order to prevent the advance of erosive processes, particularly on internal roads. One of them is constructing small contour lines at specific spots on the roads, defined with the help of a topography team, to reduce the impact of rainwater flow. Those lines must be correctly positioned, perpendicular to the slope, with one or two water exits leading to the plantations.

The correct planning of roads can also minimize risk of damages to the soil. Road construction should, whenever possible, respect the slope of the terrain, in a way that the stands are divided in a fishbone shape. Road opening and maintenance should avoid

Other actions can be necessary depending on the area's susceptibility to erosive processes, such as:

- Construction of roadside containment basins on the border of the stands;
- Long term monitoring, in order to identify and repair erosive processes while on initial stages;
- Identifying of water accumulation spots to construct contour lines;
- Identifying and repair silted contour lines;
- Identify and repair contour lines that have been damaged due to machinery traffic;
- Avoid compaction of contour lines to allow better water infiltration.

Monitoring of erosive processes must be carried out continuously, with the collaboration of all staff. All employees must be instructed to report any signs of damages to roads and stands and any other abnormalities that can lead to erosive processes. Such abnormalities must be registered in a specific document, as well as a schedule of actions to be taken, aiming at correcting the problem as fast as possible.

3.4.1.3 Maintenance of Organic Matter Cover

The maintenance of organic matter cover is important to avoid damages to rainwater impact and flow and to maintain the soil fertility. To maintain organic matter cover, is recommended that the maximum amount of forest residues be kept on the stands. This must be taken into account when planning the harvest operation, prioritizing harvesting systems such as cut-to-length.

Land preparation before each re-establishment must prioritize manual or mechanical sickle on planting row, leaving all vegetal remains in between the rows to protect the most sensitive areas and promote nutrient cycling. Harvesting residues can also be

chipped and distributed evenly on the stand. Burning of residues should be avoided, as it removes the organic matter cover and reduces the soils fertility in the long term.

In case harvest residues are to be removed from the stands for commercialization or use as energy source, the fertilization recommendation must be revised.

3.4.1.4 Soil Contamination

All operations must be carried out in compliance with measures to prevent the risk of soil contamination.

Machinery fueling and maintenance in the field must attend to at least the following preventive measures:

- A distance of 100 meter from protected areas and water flows must be respected;
- Fueling must only be carried out over a containment structure with sawdust, aiming to avoid spilling of fuel on the soil;
- Before any activity of maintenance and fueling of machinery, the soil must be covered with an waterproof cover, to avoid the contact of oils and fuels with the soil.

Besides that, any container of chemical product that needs to be in the field, such as chainsaw oil, must be kept inside a containment structure to avoid contamination. Also, contaminated material such as gloves, towels and machinery parts must never be placed in direct contact with the soil.

Any kind of residues generated on field operations, especially hazardous residues, must be disposed of correctly.

In case of accidents that can result in soil contamination, such as leaks of fuels, oils and pesticides, the following steps must be carried out:

- Isolate the place;
- Report the accident to the headquarters;
- Locate the Emergency Kit;
- Contain the leaking by constructing barriers or ditches, stopping it from spreading and contaminating water bodies;
- Protect the soil by placing a canvas under the machinery or equipment;
- Scatter sawdust or sand through the affected place to absorb the leaking product;
- Remove the contaminated soil, using a shovel or hoe, and put it inside identified plastic bags or drums;
- Forward the contaminated material to a company specialized in the treatment of this kind of waste;
- Request external support from specialized company, if necessary;
- Evaluate the contamination of soil and water.

3.4.2 Water Usage

The water will be obtained from small dams (deposits with water accumulation used in cattle rising) and, in some cases, from artesian wells.

The location where those dams and wells will be located and the estimate water volume is still not defined, but Paracel will perform studies and get the duly authorizations not to cause impacts on the aquifer and its users.

It should be noted that there are already 14 wells for groundwater uses in the plantation. The current location of the wells are presented at the table below.

Table 2 – Existing wells

No.	Site	ID	Depth (m)	Coordinates (UTM WGS84 Zone 21K)	
				E (m)	S (m)
1	Trementina - Central	GW10	60	516254	7484946
2	Trementina – R. Michel	GW11	115	518643	7484801
3	Trementina – R.Laguna	GW12	65	516419	7478307
4	Trementina – R. San Juan	GW13	70	509767	7486076
5	Zanja Moroti	GW14	102	493064	7499176
6	Soledad	GW15	107	483316	7497562
7	Gavilán	GW16	97	505125	7498320
8	La Paraguaya	GW17	NDA (*)	489833	7492572
9	Zapallo	GW18	NDA	548201	7512128
10	Hermosa	GW19	NDA	512695	7515558
11	Santa Teresa	GW20	NDA	537999	7498476
12	Machuca Cue	GW21	NDA	495202	7489899
13	Silva Cue	GW22	NDA	509830	7484037
14	San Liberato	GW23	NDA	516367	7503054

Source: PARACEL, 2021. (*) NDA: No Data Available

Enclosed is water consumption estimate by age/operation activities. This estimate only refers to direct consumption according to the planned operations. Potential consumption related to fire control or nurseries are not included. According to this estimate:

- Year zero (plantation): 5.3 m³/ha
- First year: 0.24 m³/ha
- Second year: 0.24 m³/ha
- Third to sixth year: no water consumption

3.4.3 Energy Usage

The afforestation activities will require electricity only for the domestic and administrative activities that will take place in the building infrastructure of the ranches. For this, the electrical energy available through the existing national network will be used. No new transmission or distribution lines will be required, or an increase in the power supplied.

3.4.4 Inputs, Agrochemicals, Fertilizers and Pesticides

In compliance with the FSC policy on use of Highly Hazardous Pesticides - HHP (SC-POL-30-001 V3-0), PARACEL will exclude the use of all hazardous pesticides that contain or main contain active ingredients listed as prohibited by the FSC.

The HHP listed by the FSC as highly restricted can be used when there's no viable alternative methods, evidenced by analysis of costs, risks and social and environmental impacts.

The HHP listed by the FSC as restricted can be used as an auxiliary method to non-chemical treatments, subject to exhaustive analysis of environmental and social risks for the active ingredient to be used.

At the operational level, at first, the highly hazardous pesticides are identified as prohibited, of highly restricted use or of restricted use, due to their hazardous level. When the integrated pest management identifies the necessity of using a chemical pesticide as the last resource, an evaluation of social and environmental risk must be carried out on different levels to identify the nature and level of risk, as well as to define mitigation measures and requirements for impact monitoring.

PARACEL's policy on the use of pesticides highlights the importance of repair and compensate the damages that have been potentially caused to environmental values and the human health, as well as the importance of monitoring the use of pesticides and the impact of the policy itself.

PARACEL will make efforts to investigate the products and control methods of weeds in order to diminish the use of HHP with a view to their complete eradication. Any HHP to be used will present legal registration with the competent authorities.

The general list of forest inputs is presented in the following table.

Year	Activity	Forest inputs	Unit	Dose	Surface 2021 (ha)	Total quantity
Year 0	Ants combat – pre plantation 1	Cebo - Formirex Plus	kg	2,5	18.000	45.000
Year 0	Post Emerging herbicidal application – total area	Glyphosate 79,2%	L	2,7	18.000	48.600
Year 0	Liming application – total area	Dolomitic agricultural lime	t	1,5	18.000	27.000
Year 0	Gypsum application – total area	Gypsum	t	0,5	18.000	9.000
Year 0	Base fertilization	NPK (12-20-16)	t	0,4	18.000	7.200
Year 0	Ants combat – pre plantation 2	Cebo - Formirex Plus	kg	2,5	18.000	45.000

Year	Activity	Forest inputs	Unit	Dose	Surface 2021 (ha)	Total quantity
Year 0	Pre-emergent herbicide application in line 1	Isoxaflutole	L	0,2	18.000	3.600
Year 0	pH regulatory adherent 1	Vegetable oil and pH regulators	L	0,35	18.000	6.300
Year 0	Planting with forest hydrogel	Stockosorb	kg	3,5	18.000	63.000
Year 0	Planting clone seedlings	Seedings	unit	1313	18.000	23.625.000
Year 0	Pre-emergent herbicide application in line 2	Isoxaflutole	L	0,2	18.000	3.600
Year 0	pH regulatory adherent 2	Vegetable oil and pH regulators	L	0,35	18.000	6.300
Year 0	Pre-emergent herbicide application in line 3	Isoxaflutole	L	0,2	18.000	3.600
Year 0	pH regulatory adherent 3	Vegetable oil and pH regulators	L	0,35	18.000	6.300
Year 0	Ants combat – post plantation 3	Cebo - Formirex Plus	kg	1,5	18.000	27.000
Year 0	Pre-emergent herbicide application between row	Glyphosate 79,2%	L	1,5	18.000	27.000
Year 1	Cover fertilization	NPK Cover 1 (10-00-30 + 4%S + 0,7%B)	t	0,23	18.000	4.140
Year 1	Ants combat – post plantation	Cebo - Formirex Plus	kg	1,5	18.000	27.000
Year 1	Cover fertilization	NPK Cover 2 (00-00-54 + 1%B)	t	0,18	18.000	3.240
Year 2	Ants combat – post plantation	Cebo - Formirex Plus	kg	1,5	18.000	27.000
Year 3	Ants combat – post plantation	Cebo - Formirex Plus	kg	1,5	18.000	27.000
Year 4	Ants combat – post plantation	Cebo - Formirex Plus	kg	1,5	18.000	27.000
Year 5	Ants combat – post plantation	Cebo - Formirex Plus	kg	1,5	18.000	27.000
Year 6	Ants combat – post plantation	Cebo - Formirex Plus	kg	1,5	18.000	27.000

Source: PARACEL, 2021.

Notes: 1) common name, active ingredient, type, use, WHO and FSC classification to be detailed;
2) Alternatives substitution of Glyphosate to be evaluated

3.4.4.1 PARACEL's Pesticide Policy

In alignment with FSC's pesticide policy, PARACEL has the following short term objectives:

- Promote the best practices in order to minimize risks to human health and the environment when using chemical pesticides;
- Reduce the volume and total number of pesticides in use;
- Eliminate the use of highly hazardous pesticides.

In the long term, PARACEL aims at complete eliminating the use of chemical pesticides in its management units.

This policy applies to all PARACEL's operation areas and to all organization, work groups and entities that provide services that can make use of pesticides inside PARACEL's management areas, aiming to protect the natural vegetation, the human health and the native species. It includes all facilities and surfaces:

- Located inside or adjacent to the areas under PARACEL's valid title or control, or operated by, or on behalf of PARACEL, in order to contribute to the management activities; and
- Located outside or in non-adjacent areas to those aforementioned areas, operated by PARACEL, or on behalf of PARACEL, in order to contribute to the management activities.

3.4.4.2 Integrated Pest Management

The integrated pest management must be based in a adequate monitoring system, allowing the identification of infestations, their geographic distribution and the pests population density. In a wider sense, the monitoring program must identify the variables of interest for identification of infestations and the actions to be taken for infestations control.

A pest control program consists on the application of ecologically acceptable measures, based on the monitoring results, such as biological, cultural, genetic and mechanical measures, aimed at eliminating or reducing the necessity of chemical control.

Silvicultural control actions are part of site preparation techniques aimed at removing weeds and residues that serve as shelter and feeding and reproduction sites for different kinds of pests. Also, post-planting silvicultural measures are also important, as keeping the seedlings and trees healthy reduces the susceptibility to pest attacks. Thus, good silvicultural practices such as weed control, residues management, soil preparation, correct planting, irrigation and fertilization, when correctly undertaken, help reducing the risks of infestation.

Genetic measures consist of planting genetic material that is resistant of pest attacks. Nowadays, there are several genetic improvement processes being carried out in view of increasing natural resistance. Paracel will accompany these processes in order to always select the best genetic material available taken into consideration the benefits for the Integrated Pest Management.

3.4.4.3 Training

- All workers involved with the use of agrochemicals, whether permanent, temporary and/or third-parties, must have the proper training;
- The training must cover basic and priority topics, such as: good practices for the use of agrochemicals; correct application and elimination of agrochemical residues; correct use of PPE; basic toxicological concepts; route of entry into the body, signals and symptoms of intoxication and first aid, etc.;
- The organization must keep records of all trainings in a spreadsheet intended for that use, with a copy attached to each trained employee.

3.4.4.4 Choice and Purchase of Pesticides

- PARACEL will use only pesticides recommended to the detected pest or weed, registered, approved and permitted by the competent authority (SENAVE), and in compliance with all ratified international conventions (Rotterdam, Stockholm, Montreal, etc.);
- The use of certain active ingredient, as well as the doses to be used, must be previously authorized by the forest manager, and must comply with the process of Environmental and Social Risk Assessment to be elaborated, following the FSC policy on the use of pesticides;
- The products to be used must be selective and have minimum impact on the population of beneficial organisms and aquatic life, as well as not be harmful to the ozone;
- It is recommended not to buy any products close to their expiration date, unless their immediate use is planned.

Paracel will also comply with WHO Recommended Classification of Pesticides and IFC Guidelines for Perennial Crop Production specifically:

- Will ensure that any pesticides used are manufactured, formulated, packaged, labeled, handled, stored, disposed of, and applied according to the FAO's International Code of Conduct on Pesticide Management;
- Will not purchase, store, use, or trade pesticides that fall under the World Health Organization's (WHO) Recommended Classification of Pesticides by Hazard Classes 1a (extremely hazardous) and 1b (highly hazardous), or Annexes A and B of the Stockholm Convention;
- Will not use pesticides listed in WHO Hazard Class II (moderately hazardous), unless the project has appropriate controls established with respect to the manufacture, procurement, or distribution and/or use of these chemicals. These chemicals will not be accessible to personnel without proper training, equipment, and facilities in which to handle, store, apply, and dispose of these products properly;
- Preferentially, Paracel will use selective pesticides, where appropriate, rather than broad-spectrum products to minimize impacts on non-target species.

3.4.4.5 Security Information for Purchases

- The supplier is responsible for complying with local regulations related to safety information and therefore for providing such information to the buyer;
- When buying/receiving a product, this product must contain the “Safety Sheet”. If not provided by the supplier, the person responsible for the purchase must request the Safety Sheet of the product.;
- The company must keep records of all copies of the safety sheet of each product for use in the pesticide storage building. These copies will be kept for as long as the product is stored or in use.

3.4.4.6 Storage

- All storage facilities and containers intended for agrochemical storage will be used only for that purpose, and their basic characteristics will be in compliance with the recommendations from FAO and the competent authorities in Paraguay (SENAVE), other than being in line with WHO and Perennial crop production guidelines by IFC;
- The storage room must be kept in good conditions, protected from adverse climatic phenomena, the entry of animals and unauthorized people;
- The access to the storage room must be restricted. The door must be always locked, with key available only to authorized personnel;
- Signaling: the storage facility must be identified with the proper safety signs, indicating the storage of agrochemicals and the restricted access. The inside of the facility must contain signs indicating the prohibited activities (such as smoking, eating and drinking) and the obligation to wear PPE while inside. The location of safety elements such as absorbent materials and fire extinguishers must be marked;
- The labels of the products must be always visible to facilitate identification;
- Powders, granules and wettable powders must be stored in cardboard boxes, just like concentrated preparations;
- Maintain the stacking of boxes to a minimum, according to each product’s specifications;
- Expired products must be stored separately from other products, in a visible and identified place, until their disposal, which will be carried out based on a plan of disposal of expired products. These products will be deleted from the inventory data only after their final disposal;
- The products should be maintained in their original package. In case of fractionation, the new container must be clearly identified, avoiding the use of containers that can lead to confusion, such as those from beverages, medicines or food;
- The following recommendations must be followed in order to avoid leaks or accidents: 1) Products stored in bags, drums and plastics must be stored on pallets, never in direct contact with the floor. 2) Liquid products must be stored separately from powdered products; if that’s not possible, powdered products must be stored on the upper shelves and liquids on the lower shelves. 3) Products

with hard containers must always be in an upright position, with their lids or openings facing up;

- The storage facility must contain: 1) fire extinguisher in good conditions, located in visible and identified places, with easy access. The use of ABC dry chemical fire extinguishers is recommended. 2) Absorbent materials, in case of leaks, like sand or sawdust buckets in sufficient quantities, visible and marked, as well as elements to collect spilled product (broom, scoop and waste container);
- The quantity of stored agrochemical must be kept to a practical quantity, just enough to cover the demand peak. The products must be organized in a way that allow the oldest products to be used first, thus avoiding the expiration of the products;
- There must be a record of all stored products in a product inventory worksheet, allowing the following data to be identified: product identification (commercial name, common name, active ingredient), date of entry, expiration date, toxicological classification, quantity delivered and remaining quantity.

3.4.4.7 Local Transportation

- The contractors must specify a person who will be responsible for the removing the products from agrochemical warehouse and transport them to the places of application;
- Products must be transported exclusively, that is, they must not be transported with other products. The vehicle must have the driver's cabin separated from the cargo area, which, in turn, must have adequate ventilation and containers for the storage of products;
- Products must be stacked in the vehicle in an orderly manner, making sure that fragile containers will not be crushed;
- The load must be distributed evenly in order to avoid displacement and/or bumps;
- The liquid products must be placed below those of powder or granules formulation;
- Liquid products must be transported with the top upwards and must not be submitted to excessive load pressure;
- Containers made of paper, cardboard or other water-soluble products must be protected from the rain or bad weather with a waterproof cover;
- Small containers must be placed inside bigger waterproof containers.

3.4.4.8 Application

- Before the application, check the availability of personal protection equipment, and if they are adequate for that use (gloves, filter masks, protective clothing, boots, aprons, goggles, etc.);
- The forestry coordinator and field assistants are responsible for supervising the preparation of mixtures according to the dosage, surface and products to be

applied. The indications issued by the technical manager must be recorded through Service Orders;

- Field workers must prepare and load the mixture into the sprayer tractor (uniport) or manual sprayers (backpack sprayer) very carefully. The workers responsible for making the mixtures must be trained for the job;
- Before dosing, the container label should be read carefully and the product manufacturer's instructions must be followed. The mixtures should be prepared outdoors, away from living areas. The containers must be opened carefully, avoiding splashes or spills on the body. Safety measures must be taken to prevent contamination of soil and water sources;
- The preparation of the mixtures must be carried out on a smooth, waterproof surface, not directly on the ground. In cases where there are no waterproof floors for the preparation, the mixtures must be carried out inside containers to avoid losses and small spills. All items used for the preparation must be used solely for this purpose;
- Before application, the operator must check the correct operation of the backpack sprayers, if the nozzles are clean and without obstructions and if there are any leaks in the hose. Nozzles must be cleaned with a suitable brush;
- Before, during and after the application, the person responsible for this task must adopt the necessary precautions for protection against intoxication risks, whether due to direct or indirect exposure. Likewise, precautions must be taken to avoid the contamination of soil, water and natural vegetation;
- Application must be carried out following the established use recommendations, respecting the direction and speed of the wind, as well as temperature and humidity. Unfavorable atmospheric conditions are: high temperature (above 32 °C), relative humidity below 60% and wind speed above 10 km/h;
- A 100 meter protection range must be kept between the application area and all human settlements, educational centers, health units, squares, places of public attendance and all water courses;
- There must be no other people working in the area where application is being carried out;
- It is strictly forbidden to eat, drink or smoke while handling and/or applying the product;
- In cases where there is a surplus of the applied solution, the elimination must be carried out by applying it to fallow land, ensuring that the doses do not exceed what is allowed. Under normal circumstances there should be no surplus. If the application will continue the next day, the backpacks must be kept in a protected place.

3.4.4.9 Equipment Washing

- The equipment used for the application must be washed rigorously and immediately after use in the same area of application;

- The clothing for the application must be washed on piece at a time, separately from the rest of the personal clothing. Workers must not take contaminated clothing or PPE to their home;
- The water used to wash the equipment must be disposed of in authorized laundries at the PARACEL plant, in septic chambers with activated carbon filters. This water must never be disposed of near homes, corrals, sheds or in canals, streams or other water sources;
- All personnel involved in the dosage and application specifically with backpacks must shower at the end of the application day, using specific shower facilities intended for that use, with a sufficient supply of water.

3.4.4.10 Elimination of Pesticide Packaging

- The elimination of pesticide packaging must be carried out according to the waste management policy.

3.4.4.11 Personal Protection

- The use of protection equipment is mandatory for all personnel involved with agrochemical handling. These PPE must be provided to the workers by the employer. Records of the provision of such equipment must be kept at the disposal of each contractor. The use of PPE must be monitored;
- Each contractor must provide the necessary PPE in good condition, as well as training in PPE use. Those equipment must be renewed according to the necessity;
- It is mandatory for the personnel who handle agrochemicals to correctly use the PPE;
- PPE include work clothes, gloves, goggles, masks with activated carbon filters, safety shoes, etc. The use is exclusive for the activity, always respecting the indications for each product and activity;
- PPE must be kept clean and preferably hung up, in a ventilated, clean, cool and dry place, protected from heat and sunlight, and intended only for this purpose. PPE should not be stored in the agrochemical storage;
- Face shields or masks must be cleaned with a bactericidal agent. After cleaning, they must be stored in their original bags;
- The frequency of replacement of filters in respiratory protection equipment depends on the airborne concentration of the toxic agent (exposure). In case of repeated exposure, the filters must be replaced when the worker perceives resistance during inhaling or change in the color of the filter.

3.4.4.12 Emergency Actions

- In case of contact with agrochemicals, wash the affected area with plenty of water and soap. For products coded with toxicity grade II, seek medical assistance. Any accident related to the use and handling of agrochemicals must be reported to the health and safety manager, who will carry out the corresponding record and the pertinent actions;

- Emergency telephone numbers must always be available in a visible place, including the numbers of the nearest hospital, health centers, fire department and institutions from which to request assistance, such as SENAVE, poison control center, product suppliers.

3.4.4.13 Product Spills and Losses

- In case of spills or loss of products, the contaminated area must be isolated;
- PPE must be used before carrying out any decontamination actions;
- Sufficient absorbent material must always be available in identified containers, as well as cleaning materials (broom, shovel, etc.);
- The spilled product must be absorbed with recommended material (sawdust or sand). This action must follow the procedure for spilling in the product sheet;
- Solid products must be carefully swept, trying not to raise the product's dust, and mixed with sand to reduce the product's toxicity;
- The waste must be placed in containers intended for that use. The manufacturer must be contacted to enquire about the final destination of the product. In the meantime, it must be kept safely stored in the adequate storage facility;

3.4.4.14 Considerations on Fipronil Use

- In forest plantations, leafcutter ants are considered as one of the most damaging pests, particularly in South America, due to their resistance and adaptability to different ecosystems. Currently, the only known efficient way of dealing with leafcutter ants is the application of Fipronil based products;
- The use of Fipronil is permitted by local legislation and it's currently categorized as a Restricted Use product within the FSC Highly Hazardous Pesticide List. As so, its use is not prohibited;
- The product is applied only in a timely and localized manner, by backpack sprayers, at the beginning of forest plantation. Depending on the level of infestation, its dose is gradually reduced, being substituted by other products such as Sulfluramide;
- The impacts on the use of both Fipronil (in any of its formulations) and Sulfluramide will be fully evaluated in the environmental and social risk assessment, to be developed.

3.4.4.15 Quality Assurance

- Monthly verification of the status of the PPE used by all contractor personnel must be carried out, and the findings must be registered in the PPE Evaluation Record Sheet – Contractor Personnel;
- The agrochemical storage infrastructures, their handling and the proper management of empty containers must be subject of monthly verifications;

The following parameters are to be monitored:

- Verify that the agrochemical storage facilities are tidy, have drainage routes, waterproof floor, ventilation, pits for cases of spillage, cleaning equipment, septic chamber, fire extinguishers, sand/sawdust buckets, basins to contain spillage, emergency showers, changing rooms, first aid kits and antidotes;
- Verify that the empty container storage is tidy, has a waterproof floor and is ventilated;
- Control of empty containers that have gone through triple-rinsing and puncture process;
- Verify that other work tools, fire fighting equipment, fuels, oils and other products and equipment are not being stored in the agrochemical storage facility;
- Control of the registration of expiration date of products at the time of delivery and the updating of the stock sheet;
- Verification of fire extinguishers – location, expiration date, accessibility.

3.4.5 Labor Force, Worker Accommodations and Labor Structure

PARACEL is in the early stages of construction and pre-operation planning. It is estimated that the forestry area will generate approximately 3 thousand jobs, between own contractions and outsourcing, during all the steps of the project – feasibility, construction/implementation, implementation and pre-operation, operation-learning curve and operation.

PARACEL’s policy on human resources prioritize the employment of local or national workforce as the first and second options respectively over foreign labor.

PARACEL’s program on developing and hiring local workforce aims to provide job creation to the local community through hiring and training both qualified and unqualified workforce in the project’s area of influence. One of the measures Paracel is undertaking to achieve that goal is the development of partnerships with education institutions related to the Ministry of Labor, in order to promote training and qualification courses to local communities.

Moreover, PARACEL’s hiring policy aims to provide equal opportunities for men and women, promoting equality in hiring, remuneration and promotion.

Table 3 – Project's workforce

Source	Feasibility	Construction / Implementation	Implementation and Pre- Operation	Operation – Learning Curve	Operation
PARACEL	15	35	45	50	50
Outsourced / Third Party	255	1,300	2,500	2,700	3,000
Total	270	1,335	2,545	2,750	3,050

Source: PARACEL, 2021.

It is expected that the accommodations for forest workers will be temporary, modular structures that mobilize following project work fronts. The details about their location and the quantity of modular structures needed will take place with the plantation contractors. These structures will be designed to accommodate 50 to 100 worker. The

design, construction, and maintenance of these worker accommodations would be responsibility of future plantation contractors, but PARACEL will supervise to assure the accommodations meet the Applicable Standards (including 'Workers' Accommodation: Processes and Standards, A Guidance Note' by IFC and the EBRD, 2009). Once details are confirmed, the plantation ESIA's social baseline will reevaluate impacts related to worker influx and workers accommodations.

As a primary estimate, between 10 and 20 modular structures would be in place simultaneously during the initial planting period (6 years), an amount that may reach some 30 when the harvest period begins.

The detailed layout and design of the accommodation facilities will be the responsibility of each contractor, according to the following general criteria (as a minimum):

- Accommodations must be located to avoid flooding and other natural hazards, and the site must be adequately drained;
- Living facilities must be built with adequate materials, provided with adequate ventilation and illumination (both natural and artificial), kept in good repair and kept clean and free from rubbish and other refuse. Minimum density standard is 10 m³/resident (volume) and 4 m²/resident (surface). A separate bed (with mattress, pillow and cover) for each worker and separate sleeping areas for men and women must be provided;
- Facilities for the storage of personal belongings for workers must be provided;
- Cooking and canteen facilities must be provided, adequately furnished. Minimum density standard is 1 m²/worker. Kitchen must be provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying;
- Sanitary facilities must be located within the same buildings group, and must be kept clean and in good repair. Minimum density standard is 1 unit to 15 workers. Facilities must be provided separately for men and women;
- Adequate facilities for washing clothes must be provided. Work clothes used in contact with agrochemicals must be washed in special laundry facilities which could be provided by Paracel;
- Free potable water must be always available to workers. Drinking water quality must meet the National Standard *NP 24 001 80*;
- Facilities for waste discharge must be provided. Waste must be managed according to *PR-SA-F02 Comprehensive Waste Management Program*.

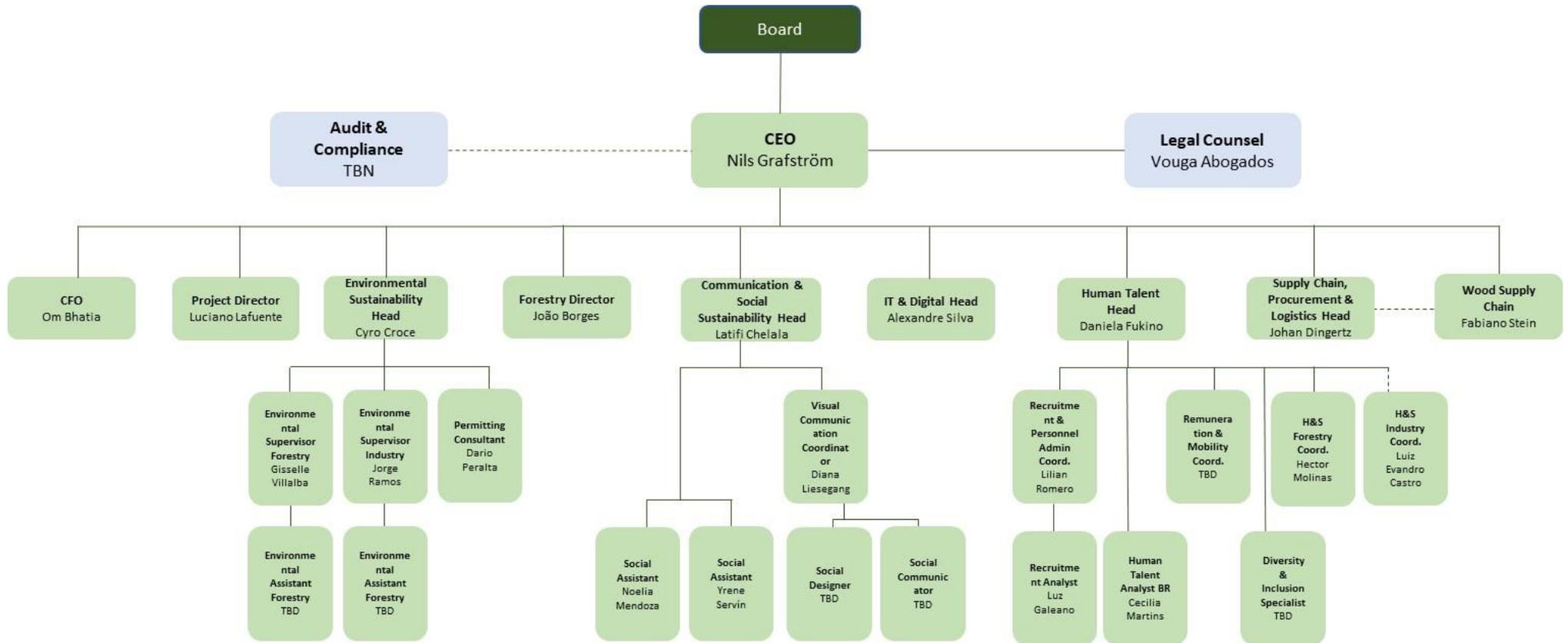


Figure 4 – PARCEL's labor structure. Source: PARCEL.

3.4.6 Species

The following Eucalyptus species will be prioritized by PARACEL for market purchase: *E. urograndis*, *E. grandis*, *E. dunnii*, and *E. saligna*. Other Eucalyptus species, such as *E. camaldulensis* and hybrids of *E. urophylla*, will be considered depending on the market availability.

For PARACEL's own plantations and third parties in Paraguay, hybrids of *E. urophylla* will be prioritized, especially *E. urograndis*.

As the area is a new frontier for Eucalyptus plantations, the selection of suitable species and genetic material will be based on a long term project, based on the species and genetic material that better adapt to edaphoclimatic environment and meet the mill requirements in terms of pulpwood supply.

The use of Eucalyptus species is justified by their high productivity, which is expected to be around 30-40 m³/ha/year, according to data from similar regions in the state of Mato Grosso do Sul, Brazil. Eucalyptus plantations currently cover roughly 100 thousand hectares in Paraguay.

3.4.7 Land Preparation

3.4.7.1 Soil Preparation

The main objective of preparing the area and soil for planting forest species is to provide sufficient amounts of water and nutrients as quickly as possible for the establishment of seedlings, ensuring their fixation on the ground and avoiding future falls. In summary, the activities of soil preparation and its applied techniques, in addition to seeking the rapid growth of the root system from the overturning of the soil, facilitating the absorption of water and nutrients, also eliminate undesirable weeds, contributing to the management of weed competition (GATTO et.al., 2003).

Tillage is also a technique that contributes to increasing forest productivity, since most of the cultural residues are kept on the soil surface, ensuring the maintenance of organic matter on the soil, protecting it from the impact and speed of rainwater, conserving soil moisture and improving soil fertility and soil micro and mesofauna (PAES et.al., 2013).

Of all the different options and techniques used for soil preparation, subsoiling in the planting line has been one of the most consolidated ones in the forest environment, since it directly benefits the development of the root system of plants and also presents operational advantages due to greater work capacity, resulting in economic advantages due to its lower cost (PAES et.al., 2013 apud DEDECEK et.al., 2007).

In the case of the Concepción region, climatic variations are observed throughout the year, mainly rainfall, which alter the ideal humidity conditions for soil preparation, especially concerning the peak moments of deficit and water surplus. Soil preparation during periods of peak of water deficit may result in the formation of cracks and clumps, which generate an inadequate condition for planting due to the formation of air bags, empty spaces without soil. Those air bags impair the survival of seedlings right after planting and/or prevent the proper development of the root system. In the period of peak and excessive rainfall, the soil becomes soaked, which can hinder mechanized activities and produce inadequate soil preparation by only scratching the soil, since the subsoiler stem does not find enough strength to turn the soil.

To minimize the effects of drought and rain peaks throughout the year, it is recommended that soil preparation be carried out during the transition periods from rain to drought and vice versa, concentrating activities on the windows from February to August and enabling plantations throughout the year, in times of milder temperatures.

Due to the characteristics of the soil in the region, the structure and stages of soil preparation activities, the following sequence is recommended:

- 1st Harrowing: to revolve the layer of the superficial structure of the soil, reducing the sub-superficial and superficial compaction;
- 2nd Harrowing: when necessary, it has the function of removing soil clumps and leveling soil surface;
- Deep soil preparation: the activity begins with subsoiler or ripper, preparing the soil to depth of 50 to 60 cm, for subsoiler, and up to 1 m if the ripper is used. The ripper is recommended on soils that have a deep impediment layer, and its use is intended to help better anchor the roots in depth for better root development and tree stabilization.

Soil preparation activities are activities that establish planting spacing, that is, spacing between planting lines. In this sense, it is recommended to use machines equipped with GPS or similar equipment, also known as "automatic pilot" that guide the correct demarcation of the planting lines.

3.4.7.2 Fertilization

In addition to good preparation and establishment of planting and adequate choice of spacing, fertilization is yet another extremely important pillar in forest productivity, being responsible for significant gains in increasing the volume of wood (SANTANA et. Al., 2008).

The decision for any fertilization should always be based on economic and technical criteria. The strategy of a fertilization program consists of knowing the soil, its physical and morphological chemical characteristics, in short its pedology, as well as the characteristics of the growth curve of the genetic material to be planted, its potential productivity and nutritional demand to support the expected yields.

The knowledge of the growth phases and rainfall distribution are fundamental to determine the fertilization operations, since the use of the fertilizer by the plant depends on its nutritional demands, as well as the availability of water in the soil to make nutrients accessible to the seedlings, that is, soil conditions and their portion explored by the roots.

The knowledge of the nutrient balance is also essential for the sustainability of forest production, which reinforces the need for adequate long-term management strategies. Thus, it is necessary to have knowledge of the relationship between the amount of nutrients that are exported and the bioavailability of nutrients at the place of cultivation, in order to be able to apply techniques aimed at sustainable forest management for several rotations (SANTANA et. Al., 2008).

Fertilization in general has the basic NPK formulation, which represents the main primary macro nutrients: Nitrogen, Phosphorus and Potassium. The NPK formulation

can contain different combinations of concentration of these 3 elements, in order to meet the needs of each plant, according to its stage of development and soil fertility.

Nitrogen (N) is the component of greatest importance for the initial growth, as it is present in the composition of the most important biomolecules, such as ATP, NADH, NADPH, chlorophyll, proteins and numerous enzymes (BREDEMEIER & MUNDSTOCK, 2000 apud MIFLIN & LEA, 1976; HARPER, 1994). This way, this is the most important nutrient for the first fertilization, carried out before planting. Phosphorus (P) is also essential for the initial growth, as it is directly related to energy storage and root formation. In turn, potassium (K) has direct responsibility for the development of plant tissue and assists in resisting water deficit by regulating the functions of opening and closing the stomata of the leaves, which in turn regulates the “loss” of water by plants.

Therefore, for the first fertilization, a higher dosage of N and P is recommended to guarantee the initial development of the plant, while in following fertilizations K becomes the key component in the growth and health of more adult plantations.

In general, the practice of fertilization depends on technical and economic factors, with the most important phase of fertilization occurring in the first phase of forest development. Fertilization needs constant technical and scientific development for its improvement and must be adjusted to the needs of the planted genetic materials taking into account the characteristics of the soil, the nutritional efficiency of the fertilizers, growth curve, potential productivity, the type of harvest and management waste.

Taking into account all the growth assumptions, the genetic materials available and the soils, which for the most part can be characterized as dystrophic, the fertilization specifications are shown below, as recommended by Innovatech. It is emphasized that the recommendation should be adjusted to the extent that more specific information on the soils of the properties is analyzed and known.

Table 4 – Fertilization recommendation

Type	Period	Product	Dose (kg/ha)	Application	Location	Observations
Liming	Up to 6 months before or after planting	Dolomitic Limestone (CaO24%, MgO12%, PN 70, PRNT=70)	1,500	Full area	Over the soil	
Gypsum application	Up to 6 months before or after planting	Gypsum	500	Continuous strip near plant canopy	Over the soil	
Plantation	Up to 5 days before planting	NPK 12:20:16 + 0.4% B; 0.4% ZN; 0.4% Cu	450	Continuous strip	8 to 12 cm below the seedling substrate	
12 months	11 to 13 months	NPK 10:00:30 + 0.7% B	250	Full area or 2 continuous strips 80 - 120 cm	Over the soil	Alternating lines or airway total area

Type	Period	Product	Dose (kg/ha)	Application	Location	Observations
18 months	18 to 20 months	KCl + 1% B	180	Full area or 2 continuous strips 80 - 120 cm	Over the soil	Alternating lines or airway total area
24 months		Nutritional monitoring				
30 months		As recommended	As recommended	Full area or 2 continuous strips 80 - 120 cm	Over the soil	Alternating lines or airway total area

Source: PARACEL and Innovatech Gestão (2021)

PARACEL must install field tests for fertilization tests on different types of soils and genetic materials to optimize its fertilization strategy.

3.4.8 Sowing/Planting Plan

Once the soil is prepared and the NPK base fertilizer is applied, the areas are ready for the planting of Eucalyptus clonal seedlings to start.

Immediately preceding planting, it is necessary that the seedlings be immersed in a terminicide solution + MAP Monoammonic phosphate. This solution aims to prevent the attack of termites and improve the start and development of seedlings until the root system grows and can access the nutrients of the basic fertilization.

The seedlings must be planted in the planting line at a distance of 2.3 meters between plants. Immediately after planting it is recommended that a first irrigation be carried out and if the period is dry, with little rainfall, the irrigation should contain hydrogel based on polymers that absorb and accumulate water in order to better maintain the humidity around the seedlings, with the purpose of improving survival rate.

A second irrigation may be necessary depending on climatic conditions. After irrigation, the plants begin to establish themselves and, to guarantee operational quality, it is recommended to carry out a quality control operation to assess the survival rate. At this stage, according to the mortality percentage, it is important to assess the need for replanting. In regions in Brazil similar to Concepción, the mortality rate reaches an average of 5%, which represents an increase of 63 seedlings per hectare for PARACEL for the initial density of 1,250 trees per ha.

PARACEL plans to gradually initiate the plantation on their own areas, but it will take six or more years for these plantations to begin supplying wood to the mill.

The planting planning will follow the harvesting planning, since the production system is continuous, with re-planting or coppice taking place after clearcut, providing a sustainable source of raw material to supply the industry demands.

For example of the planting planning, **ANNEX I** presents the microplanification of San Liberato property. Same criteria of this microplanification will be used for the others PARACEL's properties.

3.4.9 Plantation Maintenance

3.4.9.1 Weed Control

Cultural treatments consist of operations to combat and eliminate invasive plants to ensure better physical and biological conditions for the Eucalyptus seedlings to grow. Trees, especially in the early stages of growth, when they have not yet closed the canopy, can suffer significantly from competition for growth resources with weeds, such as nutrients, light and moisture. Thus, the control of invasive species in the initial planting phases is fundamental for the establishment and reach of the expected yields.

It is important to highlight the importance of interdependence between cultural treatments and their interrelated impacts.

The effectiveness of weed control actions significantly interferes with the results of fertilization processes. This is because, in an adequate soil preparation, the roots grow and develop beyond the planting line and are distributed forming a root plot. In the complementary fertilization, the fertilizers are applied to the soil surface and becomes available for the weeds. Therefore, the smaller the amount and distribution of weeds, the better the absorption of nutrients by the root system of the trees.

Cultural treatments start in pre-planting operations, with cleaning activities of pre-existing vegetation, such as grasses and broad leaves, with the application of post-emergent herbicide in total area, such as glyphosate, 15 to 30 days before planting, which will promote the desiccation of existing plants. When glyphosate is not effective, due to the presence of broadleaf weeds, specific emergent powders are used and when chemical control has not been effective, physical control, such as harrowing or mowing, can be performed. The important thing is to prevent competing plants from harming the seedlings.

After planting, there are several strategies that can be used to control overgrowth and the best decision will depend on control costs as well as other factors such as: level of infestation; type of weed; application technologies; climatic condition and quantity and qualification of the workforce.

Thus, competition control of weeds in the row and between the rows should occur before planting, after 60 and 120 days, and during the first year after planting, with intensities that will vary according to the degree of infestation of the weed species in each region.

In case of occurrence of more resistant invasive species that are not controllable with the use of the herbicides available on the market, manual or mechanical combat operations will be carried out at specific points. All of these operations aim to maintain a competition-free strip of at least 1.20 meters from the seedlings, with 60 cm on each side.

In good management conditions the Eucalyptus plantation should be established in 12 months, with the canopies developed enough to promote the shading of the soil and prevent the development of weeds due to lack of light.

Depending on local resources and conditions, two chemical managements stand out as the main strategies for weed control:

- Management 1: predominance of use of post-emergent herbicides in different control operations in the row and between the planting lines;

- Management 2: predominance of the use of pre-emergent herbicides in total area.

3.4.9.2 Pest Control

In forest cultures, especially in Eucalyptus plantations, one of the main challenges to be faced is the emergence of new pests and diseases in the field and in the nursery, which directly impacts wood productivity and quality. Based on these challenges, together with definitions of genetic materials and implantation techniques, phytosanitary management strategies have been of great importance for better identification of the problem and definition of combat and prevention methods (BERTI FILHO, 1980; VOMERO, 2018) .

In addition to the proper management of pests and diseases, it is essential to have a complete plan for monitoring the occurrence of these diseases and pests and their impacts, since the occurrence of each type of pest or disease is directly related to the period of the year, depending factors such as climate conditions and other abiotic factors that can cause stress to the plants.

For both control and monitoring, the first year after planting is always the most critical and requires greater investment in both monitoring and control activities, since the risk of mortality is greater.

In the context of pests, the ant is the main enemy and, therefore, requires systematic control. Among the species, leaf-cutting ants (genus *Atta* and *Acromyrmex*) directly affect the cultivation of eucalyptus in different regions.

Other pests include the psyllid (*Glycaspis brimblecombei*), the brown stink bug (*Thaumastocoris peregrinus*), the gall wasp (*Leptocybe invasa*) and the costalimaita (*Costalimaita ferruginea*) (SANTANA, 2013; SOLIMAN, 2010; WILCKEN, 2010; ; ZANETTI et.al., 2003).

The main diseases in Eucalyptus plantations are eucalyptus rust, caused by the fungus *Puccinia psidii* and eucalyptus cancer, caused by *Cryphonectria cubensis* and *Dothiorella* sp. (WILCKEN et. Al., 2008).

Leaf-cutting ants directly affect the entire leaf coverage of plantations, impacting from newly planted seedlings to already established plantations, throughout the eucalyptus cycle (Figure 64). As a result of the reduction of leaf cover, the absorption of light and the photosynthetic process of the plant are impaired, reducing its growth capacity and volumetric increase, which affects the productivity of the forest.

The control of ants is done mainly in the dry period, by the use of granulated baits based on sulfluramid or fipronil, with two control methods: systemic combat, applying 1.5 to 8 kg / ha, according to the age of planting; and located combat, with the application of 5 to 10 g per anthill (WILCKEN et.al., 2008; ZANETTI et.al., 2003).

The application of pesticides for ant control in the pre-planting period is essential to maintain areas with a low level of ant infestation. For that, the baits must be applied in a localized and systematic way before planting. If necessary, the re-application of the product should be carried out, by means of identification and control of the anthills, to ensure that at the time of planting there is no infestation and damage the seedlings.

Considering the specific conditions in PARACEL's areas, it is important to intensify monitoring and combat measures between April and October, which is the dry period.

3.4.10 Agroforestry Research and Laboratories

Genetic improvement refers to the set of activities that aim to produce individuals with desired qualities, such as improved growth, quality and resistance to pests and environmental conditions. PARACEL follows the FSC requirements concerning the non-use of genetic modified organisms in commercial plantations.

It is important to highlight that the PARACEL Research Program (Genetics, Soil Management and Nutrition, Forest Protection and Management) will be prepared in the 2nd Semester of 2021.

3.4.11 Plantation Health Monitoring and Natural Forest Monitoring

The plantation health monitoring includes all steps related to the monitoring and treatment of all factors that can affected the trees growth or result in mortality. This includes the following programs:

- Plantation establishment monitoring: annual check on the mortality of the seedlings after plantation;
- Weed monitoring: annual check on the presence and the damage caused by weeds to the forest plantations;
- Ant monitoring: annual check on the efficiency of ant control measures;
- Forest fires: annual check on the surface of forest areas affected by forest fires.

PARACEL has plan for the monitoring of natural areas, which comprehends field surveys to evaluate the integrity of the native forest remnants every three years, including a baseline study in the first year.

3.4.12 Products and By-Products

The forest management is focused on supplying the pulp industry with wood suitable for that purpose. Eucalyptus plantations are known as being a good source of wood for the production of short fiber pulp, which is used for the production of different kinds of paper and cardboard for packaging.

3.4.13 Harvest

The forest harvesting activity consists of the operation of cutting the trees, comprising the stages of felling, delimiting, debarking, tracing and stacking. The main harvesting systems are: Cut-to-Length (CTL) or Full Tree.

In the CTL system, the wood is cut in the forest, in sectioned logs according to the intended use, allowing high performance and an efficient logistic chain. In this system the group of machines is formed by two units: a harvester (cut, process, peel, measure, optimize and trace) and a forwarder (forwarding or transport of wood to the pile on the side of the road) (PONSSE, 2020).

The Full Tree system consists of four units: feller buncher fells and grabs the entire trees, the skidder drags the whole felled trees to the loading area beside the road, delimber removes the branches and prepares the wood for transport and slasher cut the trees. The residues from branches and tips are left at the edge of the field (PONSSE, 2020).

The CTL harvesting system has the following advantages: wood without bark; all stages of the harvest carried out by a single equipment within the forest, with the exception of the forwarding; maintenance of crop residue in the field, leaving leaves, branches and tips in the forest, favoring the physical protection of the soil and enrichment of the soil from the chemical point of view.

The CTL system also allows harvesting operations to be carried out with better uniformity and reliability. The smaller the number of machines, the easier it is to manage them by a small team. In addition, when the productivity rates between the different machines in the group are balanced, the productivity of the entire group is higher (PONSSE, 2020).

For these reasons, the CTL is the recommended harvesting system for PARACEL, composed of the Harvester machines and the Forwarder (Innovatech, 2021).

For this modality, the expected productivity varies according to the two operations, which present different factors that can impact the overall performance. For cutting, the average volume per tree is one of the main factors responsible for productivity. As for the forwarding activity, factors such as relief and average forwarding distance - DMB (referring to the forwarder's walk along the field) significantly interfere in productivity.

3.4.14 Waste Management

The waste management plant will aim to reduce the generation of waste to a minimum, through efficiency of the operations, application of the best available techniques, the best management practices and the sustainable production and consumption.

The focus of the actions of waste management will be prioritized as follows: re-utilization, recycling, energy recovery and other types of recovery. The final disposal will be considered only as the last resource.

The waste management will also guarantee that all the steps to the correct management will be executed through formal activities, assuring the compliance with current laws and regulations and the best environmental practices.

Crop Residue and Solid Waste Management will be in line with IFC Environmental, Health, and Safety Guidelines For Perennial Crop Production.

The main waste generated is presented in the following table.

Table 5 – Main wastes

Waste	Rough estimates (m ³ /year)
Domestic waste (non-recyclable)	250
Recyclables (glass, paper and cardboard, plastic, metals)	50
Agrochemicals packaging (empty pesticide packages, empty fertilizer bags)	100
Hazardous (oil and oil contaminated materials, fluorescent lamps, batteries, waste from health services, paint packaging)	10

Source: PARACEL, 2021.

3.4.14.1 Segregation

The residues must be classified in the place of origin, between organic and inorganic, recyclable and non-recyclable, hazardous and non-hazardous, and stored separately in identified containers.

Third-parties will be instructed to do the same with their own residues and forward the containers to PARACEL.

All employees and third parties will be trained on the different types of residues, their classification and importance of the correct disposal.

3.4.14.2 Temporary Storage

Before being sent to the main waste storage room, the residues must be temporary stored in the place of origin, following the safety measures to avoid leaks, infiltration and odor.

The temporary storage room for hazardous residues must be closed and identified, with waterproof floor and structures to contain leaks, and with restricted access.

The containers for domestic residues must attend to the requirements of Decree 7391/2017:

- Re-usable;
- Adequately located and covered;
- Capacity to store all residues generated, taking into account the collection frequency;
- Constructed with waterproof material and with adequate resistance;
- Clear identification of the type of residue to which is destined.

The containers for temporary disposal of recyclable waste will be identified with the colors defined by the Resolution 548/96 from MSPBS and identified accordingly:

Table 6 – Identification for recyclable waste containers

Type of residue (identification)	Color
Glass	Green
Paper and cardboard (clean and dry)	Blue
Plastic	Red
Metal	Yellow

Containers for other residues will be identified with the following colors and identified accordingly:

Table 7 – Identification for non-recyclable waste containers

Type of residue (identification)	Color
General, mixed or non-recyclable	Black
Organic	Grey
Hazardous	Orange

3.4.14.3 Collection and Transportation

It will be defined the frequency of collection and the method of transportation for domestic residues from temporary storages. The recommended frequency for collection is of at least once a week, this way avoiding the proliferation of insects and odor in the sites.

3.4.14.4 Treatment

The different actions to minimize and/or valorize the waste before their final disposal can be: re-utilization, recycling, recuperation, composting and special incineration.

Non-hazardous waste, according to their type, can be destined to different methods such as re-utilization, recycling, composting, as foreseen in the temporary storage.

Hazardous waste must be treated with specific methods for each type, depending on their risk classification, and must send to third-parties authorized to handle such waste.

3.4.14.5 Domestic Waste

Organic and compostable domestic residues can be incorporated to the soil (buried or scattered) or used for animal feeding.

Recyclable clean waste (glass, paper and cardboard, plastic, metals) are separated in containers for each type to be later transported to PARACEL's mill. While the corresponding infrastructure is not available in the industrial plant, those wastes may be removed by local collectors, after registration of delivery.

Non-recyclable waste, as well as mixed or dirty recyclable, are collected separately in the black containers specifically intended for this and are then suitably stored in the temporary storage area, until their transfer to the final destination.

3.4.14.6 Harvest Residues

Dispose of the biological residues originated in harvest activities in a way to:

- Facilitate the segregation and removal of usable material;
- Facilitate chipping and subsequent distribution of the residues on the stand.

The following actions are forbidden without written authorization by the forest manager:

- To burn harvest residues;
- Keep those residues stacked for a period longer than required to process them;
- Keep residues on the border of preservation areas, water flows, low-lying areas and roads.

3.4.14.7 Final Disposal

Most of Paraguay's rural areas lack a proper service for collection and final disposal of waste, and for this reason the waste must be buried in the properties, adopting the basic health criteria.

- All residues that could not be recovered under any treatment, will be destined for the final disposal site, which may be sanitary landfill of PARACEL pulp mill

There will be no sanitary landfill destined exclusively for forest activities, due mainly to the small amount of residues that is expected to be generated by the forest area;

- Third-parties must have their own site for final disposition in accordance with the requirements established by PARACEL;
- The monitoring system must guarantee that all final disposal sites are maintained in good conditions;
- It is prohibited the disposal, abandonment or burning of waste, whatever its origin, in the open, on roads, homes, camps and in the vicinity of water bodies (streams, rivers, lakes, estuaries, canals of drainage, etc.), or in any way that directly or indirectly affects groundwater.

3.4.14.8 Pesticides Packaging Management

PARACEL will carry out the management of pesticides packaging generated in its management units according to the current legislation and norms.

Overall, these procedures require the triple-rinsing of empty pesticide packaging. The water from the triple-rinsing must be re-used as dissolvent for the product in the tanks.

All packages must have their bottoms punctured after triple-rinsing, in order to guarantee they will not be re-used. Empty packages must not remain in field after use.

It is prohibited:

- To re-use the empty pesticide packages after washing for any purpose;
- To burn or to bury empty pesticide packages;
- To dispose of or store empty packages away from the storage facility intended for that use.

Washed and punctured packages must be temporary collected, including flexible materials in their original containers (cartons, polyethylene bags or big bags), in the temporary storage facility in the camps of each contractor. Once the storage is full, empty packages must be transferred to the collection area at the PARACEL headquarters, from where the collection of empty containers will be requested. The packages will be delivered to a recycling company, which must be authorized and registered by MADES and SENAVE as a recycling company for agrochemical containers.

In the note of receipt of the empty packages that the company will deliver, it must be clearly specified the quantity and type of containers and quantity of packages with triple-rinsing and puncturing, with the corresponding signature by the person in charge of the recycling company and the person in charge of gathering. This document must be filed in a folder provided for this purpose.

3.4.15 Prevention of Forest Fires

Forest fires are characterized by the occurrence of uncontrolled fire. These are the most critical occurrences within the scope of forest protection, with environmental and social economic impacts.

The fire risks in the first year of planting tend to be low, as it is an area without large concentrations of vegetation and combustible material. The more mature the forest, the

more significant the economic losses are, whether due to the forest itself, or the risks of imbalances in the supply plan of a market or an industry.

In order to avoid fire and its consequent losses, all actions must be mainly aimed at its prevention and control. However, corrective measures must be considered and be at full capacity if they have to be put into practice.

The occurrence of the fire depends on at least two factors: cause and condition. Preventive measures aim to eliminate or minimize at least one of these factors and can be listed at:

- Eliminate or reduce the combustible materials around the plantations, by keeping firebreaks free of combustible materials such as vegetation and vegetal, in order to avoid the start and propagation of fires. The fire breaks must be more intensively managed the greater the potential risk of fire, that is, where there is a greater intensity of traffic of vehicles, machines and other vehicles not related to the forest operation. This practice must be incorporated into forestry activities;
- Monitoring of local climatic conditions, which allows estimating the probability of fire occurrence. The variables to be monitored are: temperature, relative humidity, wind and lightning occurrence. These indexes guide the preventive mobilization of contingency resources;
- Communication and education of local communities and neighbors on the importance of avoiding using fire as a practice for cleaning vegetation, as well as develop, together with the communities, a communication system to alert the occurrence fire outbreaks;
- Develop of an efficient internal communication system, in order to guarantee the quick activation of the combat team in case of fire outbreaks;
- Construction of fire lookout towers, with the objective of increasing the effectiveness of monitoring fire outbreaks. The observation of changes in the landscape can be made by human observation or with the use of more advanced technologies, such as high resolution cameras that automatically detect changes in the landscape, the presence of vehicles and other risk factors. The use of high-resolution cameras allows data to be communicated in real time to a control room that can immediately trigger firefighting brigades. In the case of human observation, binoculars and long-range visualization equipment help identifying fire outbreaks and risk factors, which are communicated via radio.

According to Venturi et.al., 2007, the implantation of a network of surveillance towers for the detection of forest fires requires studies of the topographic characteristics of the region, calculation of the visual range of the operators / cameras of the towers and analysis of maps of fire risk based on previous occurrence records. Therefore, it is important that the plots have climatology networks to assess humidity, temperature and wind speed, for the classification of potential risk areas.

Once preventive measures are taken, the likelihood of fire occurring decreases in the same proportion, but it is never possible to completely eliminate the risk of fire. In the event of a fire, the main measures to be taken are:

- Speed and effectiveness of the initial combat to the fire outbreak to prevent this outbreak from spreading and taking on large proportions. In order for the action

time to be as short as possible, an efficient system for monitoring, detecting, communicating and mobilizing firefighting resources is necessary;

- Access conditions, this means that road and bridge conditions must not prevent combat resources from reaching the desired location quickly;
- Fire brigades, which consist of a water truck structure and pickup trucks with combat kits. It is recommended to have a structure of 1 (one) water truck and 1 (one) fire brigade for each 20 thousand hectares of forest plantation, for greater agility and effectiveness in combat;
- Annual training of the firefighting team, reviewing all combat concepts and techniques, such as the use of retardants, fire-fighting techniques, cleaning and opening fire breaks, safety during combat, the essential equipment for the activity and how to handle them, etc. When properly trained and well positioned, the combat team becomes able to quickly locate the outbreaks and effectively implement the communication and control measures, thus reducing the risk of fire propagation;
- Effective communication systems, as they guarantee the quick activation of the entire combat team and almost immediate action.

As recommended by Innovatech, the table presents the items considered for the composition of CAPEX for firefighting and prevention. The estimate of the items takes into account the condition of flat relief for the entire region of the project.

Table 8 – CAPEX for control and prevention of forest fires

Item	Unit	USD/unit	USD Total
Fire lookout tower with cameras	12.5	30,000	375,000
Water truck	5.0	62,000	310,000
Firefighting kit for pickups	5.0	500	2,500
Radio communication system		(*)	
Cellphone	20.0	375	7,500
Weather station	20.0	2,000	40,000
Tablet	20.0	375	7,500
Total	-	-	742,500

(*) Values considered in the budget of the Information Technology area.

Source: PARACEL and Innovatech (2021)

3.5 Sources and Volumes of Unrelated Airborne, Liquid and Solid Waste Unmitigated Discharge into the Environment

The type and quantities of residues generated may vary according to several factors, such as climate, number of workers and time of the year, as well as where does residues are generated. It is estimated that urban residues generation averages 1.2 kg/person/day.

To quantify the volume and types of residues generated, characterization studies will be carried out during the first year of forest operation, using the quartering method, aiming to adjust the best management practices for the following years.

The types of residues will be classified as hazardous and non-hazardous, based on the potential risk they present to the environment and to the worker's health and safety.

Non-hazardous residues include forest biomass generated in silviculture and harvest activities, residues from the employees domestic activities and all other residues not classified as hazardous.

Hazardous residues include:

- Empty packages of pesticides;
- Empty containers of fuels, oils, solvents, lubricants and paints;
- Contaminated material such as tows, gloves, filter and hoses;
- Used lubricants and tires;
- Batteries and lamps;
- First aid residues;
- Contaminated PPEs;
- Contaminated absorbent materials, such as sand and sawdust.

All employees and third parties will be trained on the risks of hazardous residues manipulation.

4 ALTERNATIVES ANALYSIS

Regarding to locational justifications, giving the 6-year period necessary for PARACEL's own forests to grow and start supplying the market, the early stages of the project will depend on wood bought from the market. This wood will be sourced from different producers in Brazil, Argentina and Paraguay. The wood supply from these countries will be 70%, 20% and 10%, respectively. It is important to emphasize that the locations of these plantations are the closest and that they are already in intense wood production.

After the first years of operation, PARACEL will use Eucalyptus wood from its land in order to satisfy 80% of the demand required for the operation of the plant; and the other 20% will be provided by external producers to the company (small local producers). The PARACEL owned plantations range between 30 km and 150 km from the pulp mill site, which can be considered very good in relation to similar activities. The properties are reportedly on average 47% of Quite Natural Area (i.e. non-plantable) and 53 % of Modified Area (i.e. potentially plantable). Reportedly, that mainly pasturelands will be used as plantations, and the native forest and riparian areas will be retained and protected, which will amount to roughly 90 thousand hectares of conservation areas.

Regarding to technical justifications, the project will prioritize the following Eucalyptus varieties: *Eucalyptus urograndis*, *E. grandis*, *E. dunnii*, and *E. saligna*. Other Eucalyptus species, such as *E. camaldulensis* and hybrids of *E. urophylla*, will be considered depending on the market availability.

As the area is a new frontier for Eucalyptus plantations, the selection of suitable species and genetic material will be based on a long term project, based on the species and genetic material that better adapt to edaphoclimatic environment and meet the mill requirements in terms of pulpwood supply.

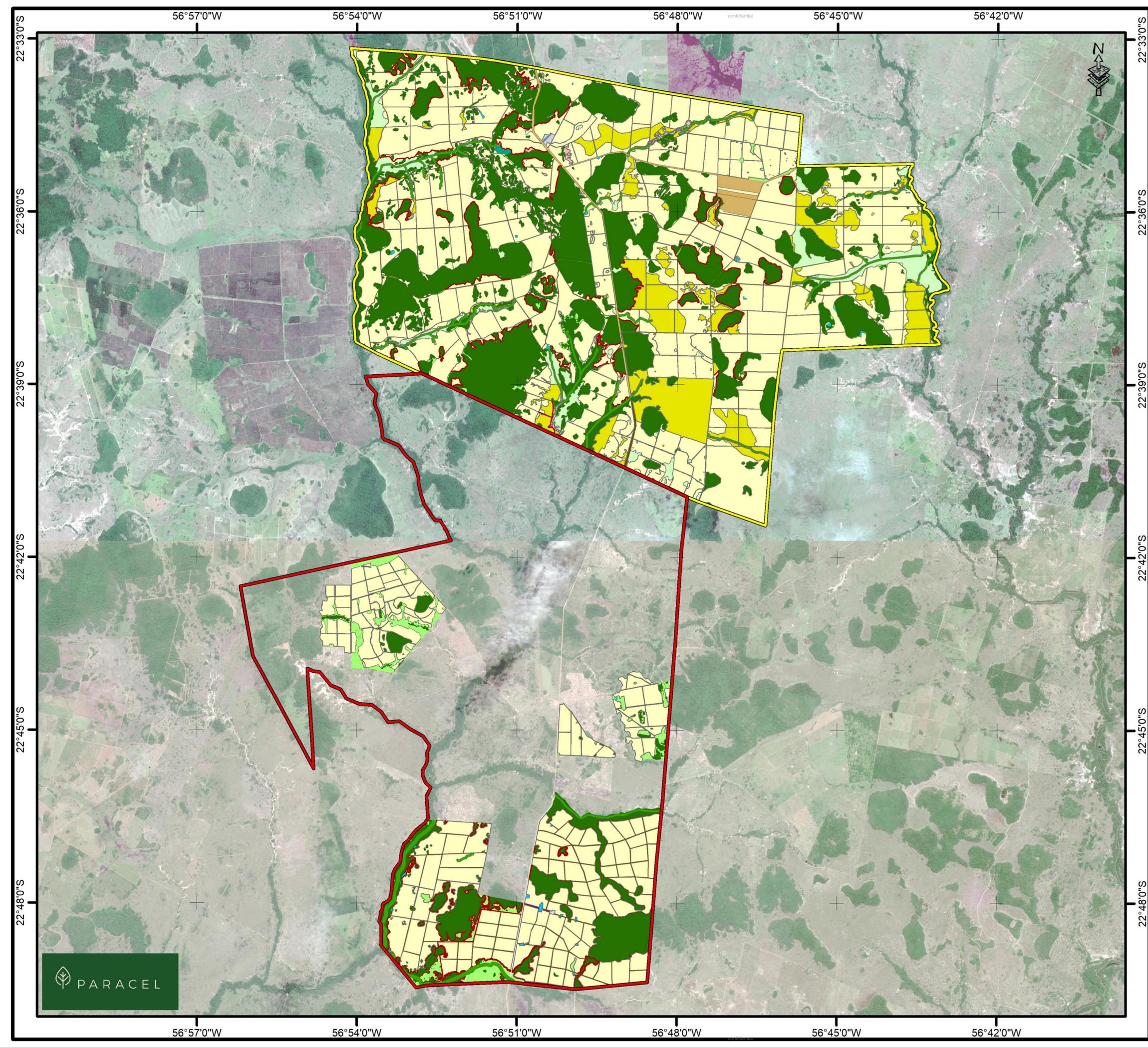
The use of Eucalyptus species is justified by their high productivity, which is expected to be around 30-40 m³/ha/year, according to data from similar regions in the state of Mato Grosso do Sul, Brazil. Eucalyptus plantations currently cover roughly 100 thousand hectares in Paraguay.

Genetic improvement refers to the set of activities that aim to produce individuals with desired qualities, such as improved growth, quality and resistance to pests and environmental conditions. PARACEL follows the FSC requirements concerning the non-use of genetic modified organisms in commercial plantations.

It is noteworthy that in the forestry operation of PARACEL will generate approximately 3 thousand jobs, between own contractions and outsourcing, during all the steps of the project. In addition, this activity fosters the local economy and generates tax revenues for the municipalities in the region and in the country as a whole.

Also, the environmental benefits provided by this cultivation are highlighted, such as maintaining soil with vegetation cover, preserving the legal reserve and APP and carbon sequestration, all guided by the environmental management system of PARACEL.

ANNEX I
MICROPLANIFICATION OF SAN LIBERATO PROPERTY



TECHNICAL INFORMATION

Projected Coordinate System: UTM
 21 Zone
 Projection: Transverse Mercator
 Geographic Coordinate System: GCS WGS 1984
 Datum: WGS 1984
 Prime Meridian: Greenwich
 Angular Unit: Degree

SCALE

1 : 160.000

REFERENCES - FORESTRY MICROPLANIFICATION

PARACEL Properties

- San Liberato (Yellow outline)
- Trementina (Red outline)

Land Cover

- Flooded / Wet land (Light green)
- Native forest (Dark green)
- Natural grassland (Light green)
- Restoration area (Teal)
- Water bodies (Blue)
- Watercourse Protection (Green)
- Apt land for planting (Yellow)
- Apt land for planting with restrictions* (Light yellow)
- Erosion (Pink)
- Existing plantations (Brown)
- Firebreaks (Red)
- Headquarters (Blue hatched)
- Road (Dark brown)
- Transmission lines area (Purple)

Flooded/Wet land	545
Native forest	6.162
Natural grassland	412
Restoration area	9
Water bodies	23
Watercourse Protection	482
Subtotal	7.634
Apt land for planting	13.901
Apt land for planting with restrictions*	1.708
Erosion	64
Existing plantations	194
Firebreaks	218
Headquarters	11
Road	443
Transmission lines area	2
Subtotal	16.541

*Corresponds to the areas that it may be partially used depending on the type of soil preparation.

