New Planting Procedure Palmas de Ixcán Limitada. "Fase Agrícola II".

Assessment Summaries and Management Plans.

Republic of Guatemala.
Alta Verapaz Department, Municipality of Chisec.

PALMAS
DEL IXCÁN

July 2020.

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1   OVERVIEW AND BACKGROUND

1.1   Company information

Palmas del Ixcán Limitada is a Guatemalan company dedicated to palm oil cultivation, was established in 2007 and currently owns a Mill, 6,400 ha of own plantations and other 4.700 ha belong from associated producers plantations. Initial plantings began in 2008 in Alta Verapaz, Petén and Quiché departments. Currently, the plantations are located in Ixcán, Department of Quiché; Chisec at Alta Verapaz Department and Sayaxché located at Petén Department.

Palmas del Ixcán Limitada shows its commitment to sustainability by meeting and following the requirements of "The New Planting Procedure, the RSPO Principles and Criteria standard" (Roundtable on Sustainable Palm Oil). The RSPO is a voluntary organization that brings together the whole related groups to the oil production such as: producers, processors, merchants, manufacturers, investors, social and environmental NGOs. The main objective of the standard was above described, is to promote the production and use of palm oil under environmental criteria, including social and economic sustainability, which allows the impacts monitoring and management the generated by agricultural and industrial practices (RSPO, 2013). As a result, the company is a member of the RSPO under the parent company "Braden Group S.A." since November 2017. Palmas del Ixcán currently has planted more than 6.800 hectares, with a Program of Associated Producers of more than 4.500 hectares and its own Mill, which currently processes 60 tons of FFB per hour. The start of clearing activities in the evaluated areas is proposed for the firts semester of 2021, after approval of the New Planting Procedure of RSPO.

1.2   Area of New Planting

Palmas del Ixcán proposes two (2) Management Units (MU) for new developments of oil palm, both localized at the north of the Guatemala Republic in the Alta Verapaz department, Chisec municipality. Together, both MU cover 559,96 ha, as evidenced in *Table 1.* According to the High Conservation Values assessment, HCVs 1, 3, 4, 5 and 6 were considered present at the landscape scale; at farm level, HCVs 1, 3 and 4 were determined present in Magdalena and Mercedes Management Units, HCV 5 is present in the Mercedes Management Unit and HCV 6 is absent in the Management Units. In total, AVC areas occupy a net total of 59,14 hectares (35,13 ha in Magdalena MU and 27,91 ha in Mercedes UM), while AMAVC management areas occupy within MU a net total of 94,25 hectares (72,06 ha in Magdalena MU and 31,07 ha in Mercedes MU). Thus, the suitable area for new developments is 461,27 hectares, of which 410,10 ha correspond to Magdalena MU and 51,16 ha to Mercedes MU. Likewise, no peat soils or local communities were identified within the Management Units evaluated (*Figure 2* and *Figure 3*).

Table 1. Management Units evaluated from Palmas del Ixcán.

Management Unit	Department	Municipality	Area (ha)	Area (%)	Suitable area for New Plantings (ha)
MAGDALENA	Alta Verapaz	Chisec	478,87	85,52	410,10
MERCEDES	Alta Verapaz	Chisec	81,09	14,48	51,16
Grand Total			*559,96*	*100,00*	*461,27*

1.3   Area of Indirect Influence

Figure 1 depicts each MU with their respective Area of Indirect Influence (AOII), which correspond to the surrounding areas where the negative and/or positive effects of developing the project could manifest. The limits of the AOII were defined according to the following criteria: a) limitation of the hydrographic basins b) the proximity of the local communities to the MU and their position downstream of the water network that surrounds them (use of natural resources), and c) road

infrastructure and municipalities boundaries. The Area of Indirect Influence of Magdalena MU covers 3,800.75 ha and is located in the department of Alta Verapaz, municipality of Chisec, whereas the Area of Indirect Influence of Mercedes MU covers 1,082.81 ha and is distributed in Alta Verapaz (municipality of Chisec), Petén (municipality of Sayaxché) deparments and a small portion at Quiché (municipality of Ixcán). In total, AOII have an extension of 4,883.56.
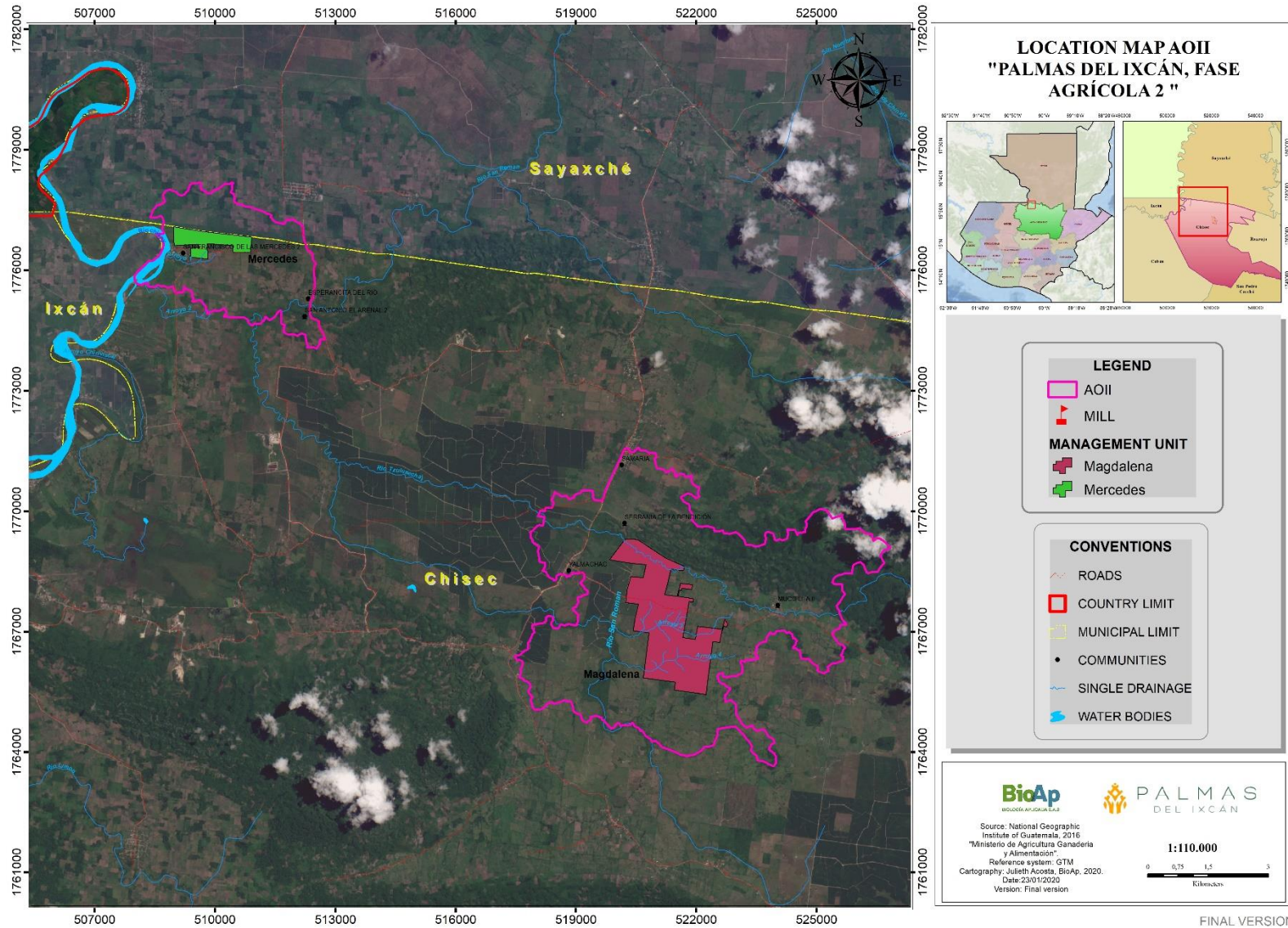
Figure 1. Location map, MU Magdalena and Mercedes and its AOII.
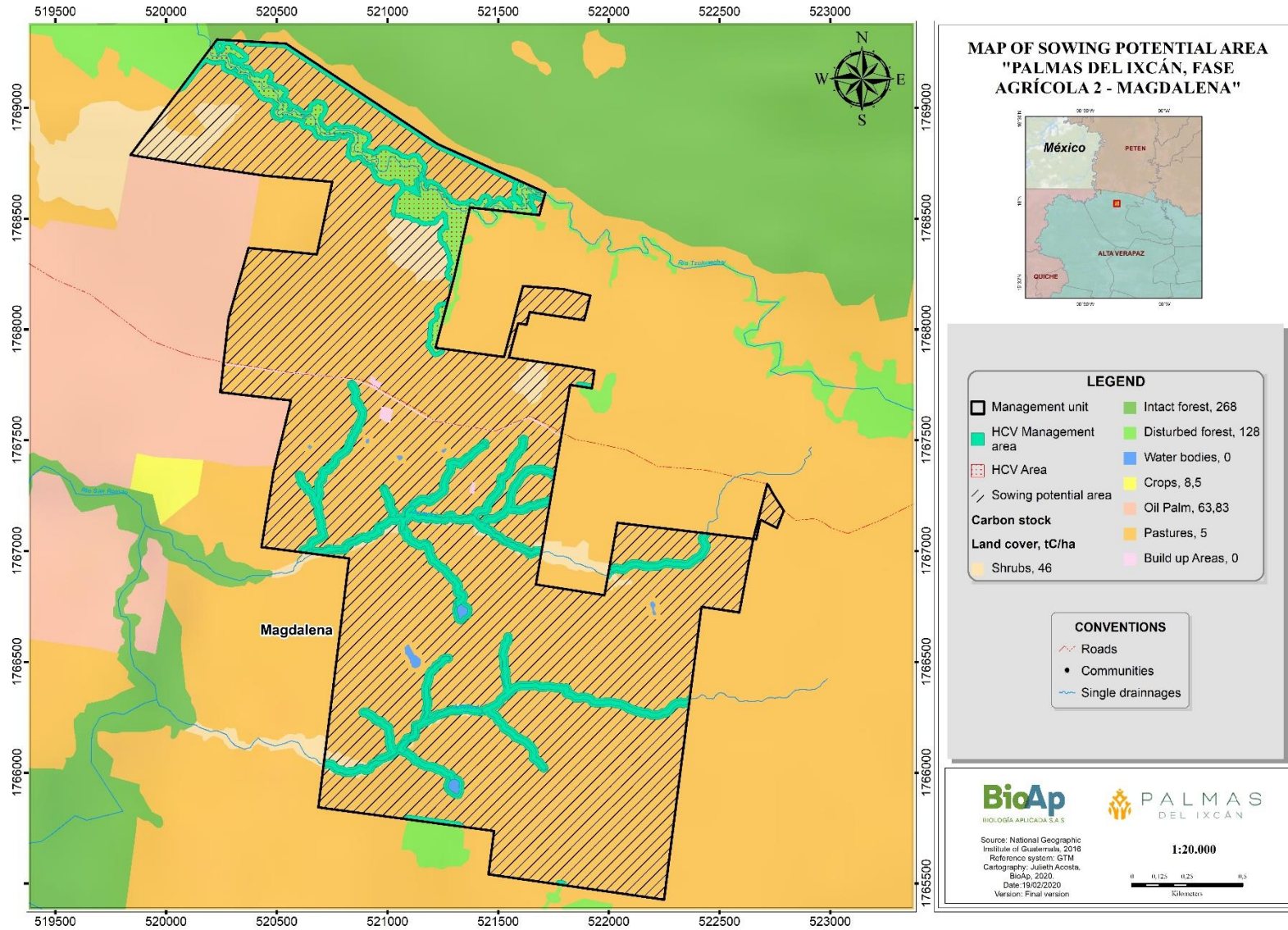
Figure 2. Map of sowing potential area, Magdalena MU.
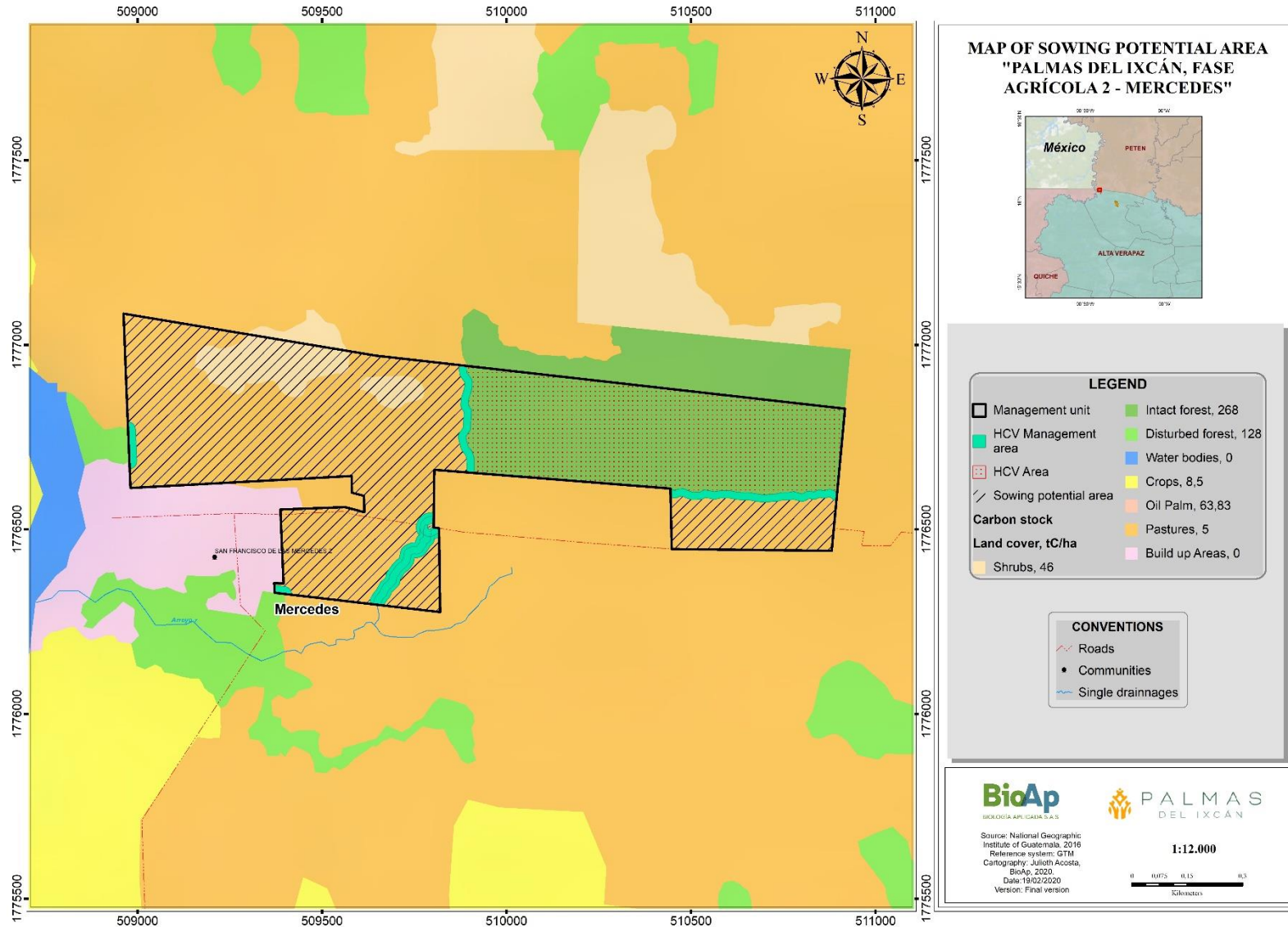
Figure 3. Map of sowing potential area, Mercedes MU.

2 ASSESSMENT PROCESS ANDMETHODS

2.1 Assessment team

The following table presents the profile of each of the professionals who participated in the preparation and development and evaluations carried out in the areas proposed for the New Palm Oil Plantations.

Name	Company	Vocational training	Expertise	Study-assessment
Juan Pablo Zorro Cerón	BioAp Biología Aplicada S.A.S.	Biologist – Lead Advisor License number: ALS14011 J Z	RSPO advisor since 2014 in Colombia, Ecuador and Mexico. Development of studies and consultancies in the elaboration of HCV and EISA. Studies of environmental impacts consultant in Colombia for 10 years.	- High Conservation Values Assessment (HCV). - Land Use Change Analysis (LUCA). - Study of Suitability of Soils and Slopes. - Evaluation of High Carbon Reserves and Greenhouse Gases (GHG)
Fabio Ernesto Álvarez Morales	BioAp Biología Aplicada S.A.S.	Biologist, Geographic Information System specialist (GIS)	General experience in spatial interpretation with GIS resources and aquatic ecosystems for environmental impact studies, and has participated as a GIS specialist in HCV studies in Colombia, Mexico and Ecuador.	- High Conservation Values Assessment (HCV). - Land Use Change Analysis (LUCA). - Study of Suitability of Soils and Slopes. - Evaluation of High Carbon Reserves and Greenhouse Gases (GHG)
Wendy Julieth Acosta Rodríguez	BioAp Biología Aplicada S.A.S.	Cadastral Engineer and Geodesta	Experience in management and analysis of geographic information, administration of spatial databases and processing of satellite images focused on the development of HCV studies.	- High Conservation Values Assessment (HCV). - Evaluation of High Carbon Reserves and Greenhouse Gases (GHG)
Jonatan Josué Torres Díaz	BioAp Biología Aplicada S.A.S.	Biologist	General experience in the preparation of Environmental Impact Studies, Environmental Management Plans, management and control of fauna and characterization of fauna and flora.	-Social Impacts Assessments
Jina Katerine Melo Ramírez	BioAp Biología Aplicada S.A.S.	Social worker	Experience and knowledge about working with communities, with emphasis on leading the planning and execution of environmental education projects, workshops and implementation of participatory tools.	-Social Impacts Assessments (SIA) - High Conservation Values Assessment (HCV).
Oscar Alfonso Escobar Soto	BioAp Biología Aplicada S.A.S.	Social worker	Experience in socio-environmental consulting and public participation related to the development of HCV studies in Guatemala.	-Social Impacts Assessments (SIA)
Maria Paula Romero	BioAp Biología Aplicada	Bioengineer		- Evaluation of High Carbon Reserves and Greenhouse

Name	Company	Vocational training	Expertise	Study-assessment
Cerón	S.A.S.			Gases (GHG)
Hugo Lionel Sánchez Rodas & Ingeniería total	Palmas del Ixcán-Ingeniería	-	-	-Environmental Impact Assessment

2.2   Social Impact Assessment (SIA)
2.2.1   SIA development chronology

Phase	Date
Pre-field phase	July 2018 – August 2018
Field phase	September 2018
Post-field phase	September 2018 - December 2018

2.2.2   Socioeconomic Impacts Assessment
2.2.2.1   Analysis of stakeholders consultation

In order to simplify the information resulting from the process of consultation with interested parties, we proceed to establish categories that group the opinions of the total number of actors consulted, for which the components of the structure of the social system are taken into account.

Table 2. Components of the social structure.

Component	Social aspect
Demographic	Inhabitant quantity Occupation Disease presence, disease transmitting vectors, mortality and morbidity, living expectations, diet. Analysis of natural and migratory movements Educational levels Active population analysis.
Political	Power relationships Decisions and communication mechanisms Community expectations Existing organization ways Conflicts
Economic	Volumes, flows and production infrastructure Productivity levels Consumption levels Land tenure ways Vulnerability Coverage and quality in public services (aqueduct, sewerage, garbage collection, electrification, communication, housing, education, etc.)
Cultural	Patrimonial (archeological, historical, cultural) Identity Familiar structure Rotting levels Vulnerability Religiosity

Source: (Arboleda, J, 2008).

2.2.3   Social and environmental impacts and aspects identification

Findings where categorized according to a categorization process. The different categories and the aspects that compose it has been developed, by grouping these aspects into subcategories. Subsequently, we proceed to identify the possible actions generating the affectation for each of the aspects.

Category	Subcategory	Social aspect
Economic	Transit and vial Infrastructure	Community easements
		Frequency of vehicular traffic
		Roads maintenance
		Risk of traffic accidents
		Alternate transit routes
	Local economy	Economic income
		Local trading
		Job offering (Labor inclusion)
		Job demand (Training and Labor Training)
Political	Communitarian relationships unrest	Communication mechanisms
		Decision making communitarian participation
		Agreements compliance
		Land legality
Demographic/ economic	Living conditions	Natural resources quality
		Social problems (consumption of alcohol, drugs, rape, common crime)
		Plagues and disease presence
		Social investment

The impacts to evaluate correspond to the subcategories identified from the analysis of the information in relation to the activities presented in the project. Each one of the impacts has a series of social and - environmental aspects that allow to visualize the critical or potential elements to intervene.

2.2.3.1   Assessment Criteria

The environmental impacts assessment generated by the development of the project, the EPM methodology also knows as Jorge Arboleda method was used. This was developed by the Natural Resources Planning Unit of Empresas Públicas de Medellín (EPM) in 1986, with the purpose of evaluating projects for hydraulic use of the company, but later it was used to evaluate all types of EPM projects and has been used by others evaluators for many types of projects with favorable results. It has been approved by the Colombian environmental authorities and by international entities such as the World Bank and the IDB. Each impact must be evaluated based on the following parameters or criteria:

Table 3. Assessment criteria.

Criteria	Description	Qualification	Meaning
Class (C)	This criterion defines the meaning of the social change produced by a certain action by the project	Positive (+)	(P) Improvement of the analyzed condition
		Negative (-)	(N) Deterioration of the analyzed condition.
Presence (P)	In most of the impacts there is absolute certainty that they will be presented, but a few others have a level of uncertainty that must be determined. This criterion qualifies the possibility that the impact may occur and is expressed as a percentage of the probability of occurrence.	True	The probability of presence of the impact is 100% (the score is 1.0)
		Very probable	The probability its 70 and 100% (the score its between 0,7 and 0,99)
		Probable	The probability its between 40 and 70% (0,4 and 0,69)
		Little probable	The probability its between 20 and 40% (0,2 and 0,39)
		Less probable	The probability its less than 20% (0.01 and 0.19)
Duration (D)	This criterion evaluates the period of active existence of the impact. It starts from the moment that its consequences begin to manifest until the effects on the environmental are eliminated. It must be evaluated independently of the possibilities of reversibility or management that the impact has. It is expressed as a function of the time of permanence.	Very long or permanent	The time period is over 10 years (rated by 1,0)
		Long	Its duration is between 7 and 10 years (0,7 – 0,99)
		Average	Its duration is between 4 and 7 years (0,4 and 0,69)
		Short	Its duration is between 1 and 4 years (0,2 and 0,39)
		Very short	Its shows a duration less than 1 year (0,01 and 0,19)
Evolution (E)	It qualifies the speed with which the impact is presented, that is, the speed as it unfolds from the moment in which the affectations begin and until the impact is fully present and all its consequences. This criterion is important because depending on the way the impact evolves; the form of management can be facilitated or not. It is expressed in terms of the time elapsed between the beginnings of the affectation until the moment in which the impact reaches its greatest consequences or until when the maximum change occurs over the considered factor.	Very fast	In less than a year the impact reaches its maximum consequences (it is rated by 1,0)
		Fast	The time lapse its between 1 and 12 months (0,7 – 0,99)
		Average	The time lapse its between 12 and 18 months (0,4 and 0.69)
		Slow	The time lapse its between 18 y 24 months (0.2 and 0.39)
		Very slow	The time is larger than 24 months (0.01 and 0.19)
Magnitude (M)	This criterion qualifies the dimension or size of the change suffered in the environmental factor to be analyzed due to a project development. It is expressed in terms of the percentage of affectation or modification of the factor (for this reason it is also called relative magnitude)	Very high	The factor affectation is more than 80%. This means that there is a destruction or total change of the evaluated factor (its rated by 1.0)
		High	The affectation is between 60 – 80%. This means that there is a partial modification when analyzed (it is rated 0.7 – 0.99)
		Average	The affectation is between 40 & 60%, that mean san average affectation of the analyzed factor (0.4 and 0.69)
		Low	The affectation level is between 20 and 40%, this means that there is a low affectation of the factor (it is rated as 0.2 and 0.39)
		Very low	A minimal affectation or modification of the factor. Less than a 20% (0.01 and y 0.19).

2.2.3.2   Impact rating

The environmental rating (Er) is the expression of the criteria by conjugated action in which the social impact was rated and represents the seriousness or importance of the affectation that this is causing. The group that is in charge of the environmental evaluations in EPM, by means of an analytical procedure, developed an equation for the environmental qualification that allowed to obtain and explain the dependency relationships that exist among the five criteria previously indicated.

$$Er = C (P [E*M+D])$$

Er= Environmental rating
C= Class
P= Presence
E= Evolution
M= Magnitude
D= Duration

2.2.3.3   Rating system

The impacts assessment is a procedure that allows, in an orderly and objective way, to establish the importance of an impact and, from this, to establish the type of socio-environmental management measures to be taken. The first applications of the equation showed results in which the environmental rate differed greatly from that obtained with other methodologies. An analysis of the matter determined that the criteria used had a different relative weight in the equation, so they should be affected by weighting constants that would balance them. Through a sensitivity analysis, the following weighting constants were determined: a = 7.0 and b = 3.0. The following equation was obtained to express the environmental rating of a specific impact:

$$Er = C (P [axEM+bxD])$$

When a & b values a replaced, we have: Er = C (P [7.0xEM+3.0xD])

According to the ratings assigned individually to each criterion, the absolute value of Er will be greater than zero (0) and less than or equal to ten (10). The numerical value that throws the equation becomes then an expression that indicates the importance of the impact, assigning qualification ranges according to the numerical results obtained.

Table 4. Attributes for the valuation of environmental impacts.

Criteria	Classification	Value
Class	Positive	+
	Negative	-
Presence	True	1.0
	Very probable	0.7 – 0.99
	Probable	0.4 – 0.69
	Less Probable	0.2 – 0.39
	No probable	0.01 – 0.19
Duration	Very long	1.0
	Long	0,7 – 0.99
	Average	0,4 – 0.69
	Short	0,2 - 0,39
	Very short	0,01 - 0,19
Evolution	Very fast	1.0
	Fast	0.7 – 0.99
	Average	0.4 – 0.69
	Slow	0.2 – 0.39
	Very slow	0.01 – 0.19
Magnitude	Very high	1.0

Criteria	Classification	Value
	High	0.7 – 0.99
	Average	0.4 – 0.69
	Low	0.2 – 0.39
	Very low	0.01 – 0.19
Weighting constants	a= 7.0	
	b= 3.0	

Negative impacts are shown using a chromatic key and is used as follows.

Table 5. Chromatic key for negative impacts.

Environmental rate (Er)	Impact significance
Er between -8.0 and -10.0	Very high
Er between -6.0 and -8.0	High
Er between -4.0 y and -6.0	Average
Er between -2.0 and -4.0	Low
Er between -0.0 and -2.0	Very Low

The identified and qualified positive impacts have a different chromatic key and can be identified as presented below.

Table 6. Chromatic key for positive impacts.

Environmental rate (Er)	Environmental impact significance
Er between 8.0 and 10.0	Very High
Er between 6.0 and 8.0	High
Er between 4.0 and 6.0	Average
Er between 2.0 and 4.0	Low
Er between 0.0 and 2.0	Very low

Subsequently, the identified impacts for each social component are described with the parameters described above, which allows us to obtain a weighted rating for the environmental impact considered. This is obtained by the average of the ratings assigned to each activity. Based on this qualification and the prioritization of impacts described below, it is possible to determine which measures will be proposed in the environmental management plan to be executed and which are the most important within the work.

2.3 Environmental Impact Assessment (EIA)
2.3.1 Direct and Indirect preliminary research
Environment and Natural Resources of Guatemala has established for that purpose was used. For the preparation and presentation of this study the follow activities were carried out:

- Reference terms for the preparation of the Environmental Impact Studies.
- Request of plans and technical information from the owner and developer of the project.
- Field visits to the project area and area of direct and indirect influence.
- Location by the use of GPS.

A two-dimensional matrix of the cause and effect of the possible impacts was used in order to assess and determine the environmental impacts, using the Leopold matrix as reference. In the matrix the project´s activities and the environmental factors which could lead to several impacts in all different phases in which the project will be executed. With this methodology, the possible environmental impacts that the project could cause during the operation phase and possible abandonment or closure are identified and evaluated.

2.3.2 Impact assessment

For this assessment, a value was identified and it was assigned to the possible impacts that may be caused in the different phases of the project. The main factors that were identified and evaluated in the matrix are described below.

- Soil impact
- Air Impacts
- Cultural and social impact
- Water Impact
- Impact on flora and fauna

2.3.3 Impact assessment criteria

The impact characteristics are valued in accordance to the next table.

Parameter	Description	Range	Qualification
Environmental rate (Er)	Defines the actions or activities, as harmful (negative) and beneficial (positive).	Negative Positive	-
Impact intensity	It refers to the Incidence grade over the action of the affected factor.	Low, Average, High, Very high and Total.	1 2 4 8 12
(In)	Defines the magnitude of the affected area.	Punctual, Partial, Extensive, Total, Critic	1 2 4 8 (+4)
Spatial extension (Sx)	Evaluates the capability of the affected factor to revert the effect	Short, medium and irreversible terms	1 2 4
Reversibility (Rv)	Way of manifestation of the effect on a factor as a consequence of an action (cause-effect relationship).	Indirect/Direct	1 4

2.3.4 Importance of impact – Rank of importance

Based on the values assigned to each environmental impact parameter, an integrative factor illustrating the relevance of the environmental impact was determined, also called Impact Importance (IMP). The values of IMP arise from the application of: three times the Intensity, plus twice the extension, plus the reversibility and the effect. Resulting values that may vary between seven (7) and sixty (60).

To illustrate the relevance of each impact, 4 ranges were assigned for the values:
- *Low Impact:* for values less than 15. The effect on the environmental component is not perceptible nor relevant.
- *Medium Impact:* for values between 15 and 27. The impacts produce notable effects and modifications on the environmental component analyzed.
- *High Impact:* values between 28 and 40. The effects substantially modify environmental conditions and, in some cases, public health, which can be clearly threatened.
- *Critical Impact:* Values between 41 and 60. Impact whose effect is higher than acceptable thresholds, producing a permanent loss of the natural conditions.

2.4 High Conservation Values Assessment (HCV)

HCV evaluation was developed in three phases. The first called the pre-field phase comprised the rapprochement with the company, the identification of its needs and objectives in relation to the HCV study, the delimitation of the evaluation areas (MU and AOII) and the gathering of secondary information about the local, regional and national context of these areas. In this same phase, the scoping or limitation of the scope was developed. In the same phase a scoping study was established, identifying the local/governmental communities in the widest landscape (IIA) that were not included in the database, and also, the main characteristics of the evaluation areas. Based on the above, both the methodology and the field phase schedule (second phase) during which the EER was carried out, the verification of coverage and the collection of primary information (all this for the biotic component) were defined, as well as the consultation of the identified and defined participants after *Scoping.*

The last phase, named post-field phase, consisted in the processing, analysis and interpretation of the data collected on field along with the secondary information, in order to identify HCV areas, HCV management areas, their principal threats and, the management and monitoring recommendations (with the respective cartography), in the MU and in AOII. This phase ends with the divulgation of results and findings to the Company and to the stakeholders related to the identified HCV areas and HCV management areas, the adjustment of their comments and by sending the assessment to the ALS of the HCVRN.

The activities carried out during the development of the HCV study, are described in *Table 7* .

Table 7 Timeline of the development of the study.

Phase	Activity	Date
Pre – field phase	First approach to the Company, presentation of the economic and technical proposal, areas to be evaluated (Management Units) and, the study-specific objectives.	July 19, 2018 – August 2, 2018
	Secondary data collection (environmental, ecologic geographic and socioeconomic) about the areas to be evaluated.	August 9, 2018 – August 15, 2018
	Consultation with the company members, including social and institutional entities, in which an analysis of the territory and the identification of interested parties was developed. From the list of criteria and its analysis (proximity, use of roads, use of resources and relationship) for communities, it is denoted that the Esperancita del Río and San Antonio de los Arenales II villages show very low weighting values in relation to the MU location. In this case, they will not get involved in the development of the study, avoiding the generation of false expectations about hiring people. The recognition of the territory is generated by verifying the information collected in the first activity, there are some assemblies with the leaders of the villages Samaría, Yalmachac, Mucbilha II and representatives of the Department of Environment of the municipality of Chisec.	August 14, 2018 – August 18, 2018
	Areas of Indirect Influence limitation, considering the project scale and the MU geographic distribution.	August 20, 2018 – August 22, 2018
	Planning and preparation of the field phase. Definition of the methodology and schedule for the development of the field phase (stakeholders identification, social work agenda, field sampling points identification (REA)), and land covers verification	August 23, 2018 – August 31, 2018
Field phase	Rapid Ecological Assessment development, land covers verification and primary data gathering (fauna and flora)	September 7, 2018 –September 12, 2018
	Carry out participatory workshops with Samaria, Serrania de la Bendicion, Yalmachac, Mucbilha II and San Francisco de las Mercedes 2 communities. In the workshop, interviews were developed to owners of neighboring farms, other oil palm companies in the AOII of Magdalena MU and members of the San Francisco de las Mercedes 2 community at Mercedes MU.	September 7, 2018 –September 12, 2018

Phase	Activity	Date
	Institutional actors consultation throughout interviews including The Chisec Health District, The Secretary of Agricultural Affairs, The Ministry of Environment and The National Forest Institute.	
	Visit to Magdalena MU with the participation of the Yalmachac COCODE members, as established in the General Assembly with the community	September 23, 2018
	Development of Mucbilha II and Yalmachac communities surveys.	September 21 and 22, 2018
Post field phase	Secondary data processing, analysis and, interpretation	September 17, 2018 – October 5, 2018
	Processing, analysis and, interpretation of field collected data (biotic, environmental and social components)	October 8, 2018 – October 19, 2018
	Document and cartography execution. Identification of HCV, HCVMA, HCV threats and management and monitoring recommendations.	October 22, 2018 – October 26, 2018
	Findings disclosure: Process of announcement and presentation of yeh preliminary results of the study, by using tools such as flipchart, maps and PowerPoint slides to the participants: Yalmachac, Mucbilha II, San Francisco de las Mercedes 2, Samaria, Serrania de la Bendicion, Ministry of Environment and Natural Resources and Secretary of Agricultural Affairs. This socialization allowed to generate adjustments in the recommendations of the HCV management and the establishment of agreements with COCODES members. In addition, approach to Mercy Corps and CONDEG (National Council of Displaced Persons of Guatemala) organizations, was carried out by email and calls. The type of approach was successful because was possible to count with different opinions of the CONDEG. Looking forward a socialization with The Chisec Health District, an announcement letter was generated, but it was not possible to establish contact with the any member, and due to regional restructuring of the National Forest Institute (INAB) it was not possible to access the new contact information to establish a communication mechanism. Therefore, it was established that the consultation with these interested parties must be developed as part of the company's internal action plan.	October 29, 2018 – November 23, 2018
	Collected information processing and final adjustment of the document and maps including the comments and/or suggestions of the interested parties. Incorporation of the results of the final consultation and findings in the document.	March 11 – 15 2019
	Delivery of the study to the Quality Panel (QP) of the HCVRN	July 31 2019
	Comments reception. First review of the HCVRN Quality Panel (Feedback)	November 25 2019
	Adjustments of the sections of the report according to the comments of the HCVRN Quality Panel and forwarding of the final document to the Quality Panel.	December 20 2019

2.4.1 Scoping

The scoping stage was developed by the lead assessor between August 14 and 18 of 2018 and consisted of field visits, approach with representatives of some interested parties and scope meetings with company managers and personnel. The activities developed by the consultant team during the scoping were the consultation and verification of geographic information, the preliminary identification of interested parties, the recognition of the proposed areas for the development of new plantations and the approach to community leaders and institutions representatives and the analysis, weighting and initial prioritization of the communities. Based on the reviewed information, an analysis of the communities present in the influence area is generated as shown in *Figure 4*. During this activity an approach with the community located in the AOII of the Mercedes MU (San Francisco of the Mercedes 2), was not necessary, since

earliest information was available on the area that the company developed in previous years. In addition, the sociologist had information resulting from previous approaches in the IIA, which facilitated the recognition and analysis of the territory.
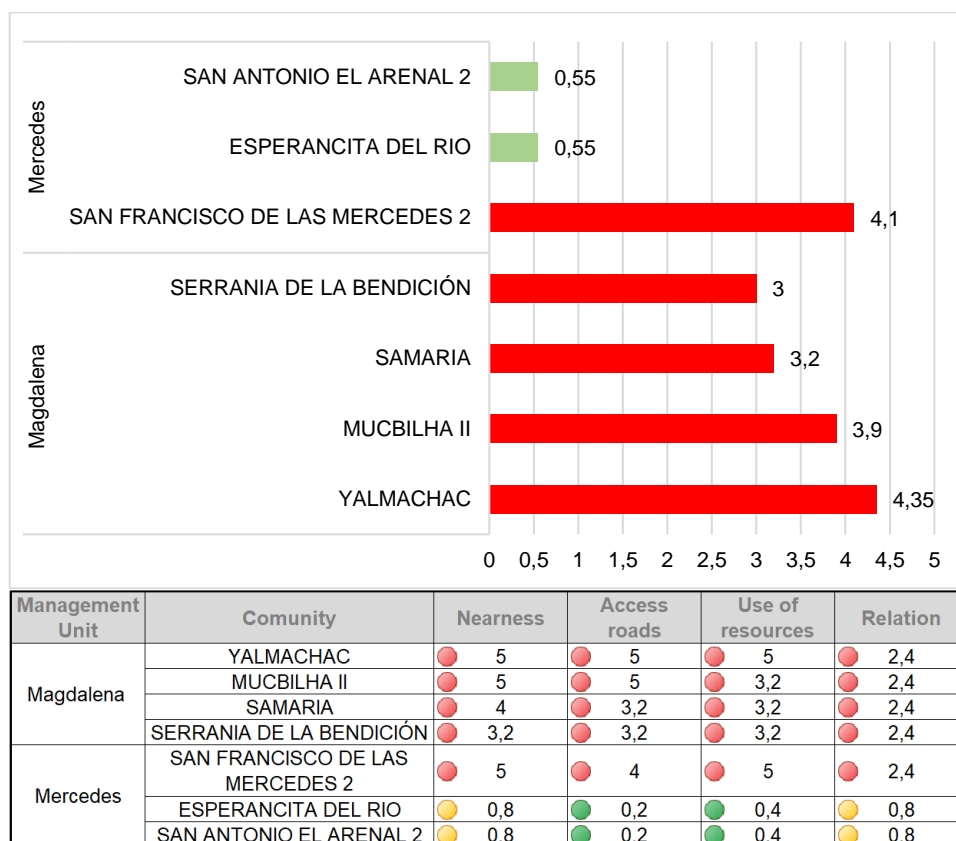

Management Unit	Comunity	Nearness		Access roads		Use of resources		Relation	
Magdalena	YALMACHAC	🔴	5	🔴	5	🔴	5	🔴	2,4
	MUCBILHA II	🔴	5	🔴	5	🔴	3,2	🔴	2,4
	SAMARIA	🔴	4	🔴	3,2	🔴	3,2	🔴	2,4
	SERRANIA DE LA BENDICIÓN	🔴	3,2	🔴	3,2	🔴	3,2	🔴	2,4
Mercedes	SAN FRANCISCO DE LAS MERCEDES 2	🔴	5	🔴	4	🔴	5	🔴	2,4
	ESPERANCITA DEL RIO	🟡	0,8	🟢	0,2	🟢	0,4	🟡	0,8
	SAN ANTONIO EL ARENAL 2	🟡	0,8	🟢	0,2	🟢	0,4	🟡	0,8

Figure 4. Identification and analysis of communities during the scoping process.

2.4.2 Geographic information

For the elaboration of the base cartography, the following sources of official information of Guatemala in environmental and social matter were taken into account (*Table 8*).

Table 8. Sources of geographic information.

Base cartography	Thematic cartography
Guatemala National Geographic Institute (IGN) y Ministry of Agriculture, Food and, Livestock (MAGA): • Communities • Roads • Drainages	*Guatemala National Geographic Institute (IGN) y Ministry of Agriculture, Food and, Livestock (MAGA):* • Climatic classification • Covertures and soil use (2010) • Ecosystems (2010) • Priority areas (2017 y 2018) • Protected areas (2017) • Biological corridors • Basins and micro watersheds (2013) • Edaphology (2010) • Archeological sites
	World Wildlife Fund, WWF WWF Biomes (2012)

Base cartography	Thematic cartography
	WWF Hotspots (2012)
	WWF Ecoregions (2012)
	Intact Forest Landscapes
	IFL (2016)

2.4.3 Land coverage/Use change and MU coverage

The land cover identification was made through visual interpretation of satellite images and the establishment of field verification points. The Guatemala national layer of coverages and land use at a scale of 1:50,000 was taken as a basis, and adjusted according to the land classes' interpretation at a scale close to 1:10,000. The visual interpretation of the Landsat 7 and Sentinel 2 satellite images was made to identify the change in land use and coverages in the MUs. According to the tonality, texture, and pattern of the images, the land cover was digitized for each of the years (2005-2018) and subsequently the change in them was evaluated by crossing information, identifying the areas in which there was profit, loss or no change in coverage. The current land covers and the vegetation classes present were confirmed by a check of field control points (precision model). As part of the verification, unsupervised classification processes were performed through Isoclusters, as well as a subsequent supervised classification through training areas, which were used as support for the differentiation of the coverages evaluated.

2.4.4 Biodiversity

Based on the land covers, ecosystems and water bodies previously identified in the Scoping stage, the sampling points were selected for the development of the Rapid Ecological Assessment (REA). The evaluation of the presence of rare, threatened, endangered and/or endemic species, as well as the conservation status of the forest fragments in the Management Units, was based on a field study focused on the identification of RTE species (fauna and flora) in these areas. The methods involved active search, visual identification and use of sound signals for birds, as well as transects and installation of trap cameras for mammals. Data collection was carried out in 26 transects, (11 wildlife transects and 15 transects combining fauna and flora) established in the gallery and riparian forest cover, dense forest, clean pastures and shrubs present in both, Management Units and in IIAs, in which sampling was also carried out. The sampling points for both fauna and flora tried to cover the largest number of vegetation classes and in the case of wildlife species, the greatest number of habitats present in the area evaluated. The transects totaled approximately 13,000 meters and 1.6 ha of sampled area for the flora component

Figure 5 and Figure 6 show the location of transects used for the Rapid Ecological Assessment (REA).
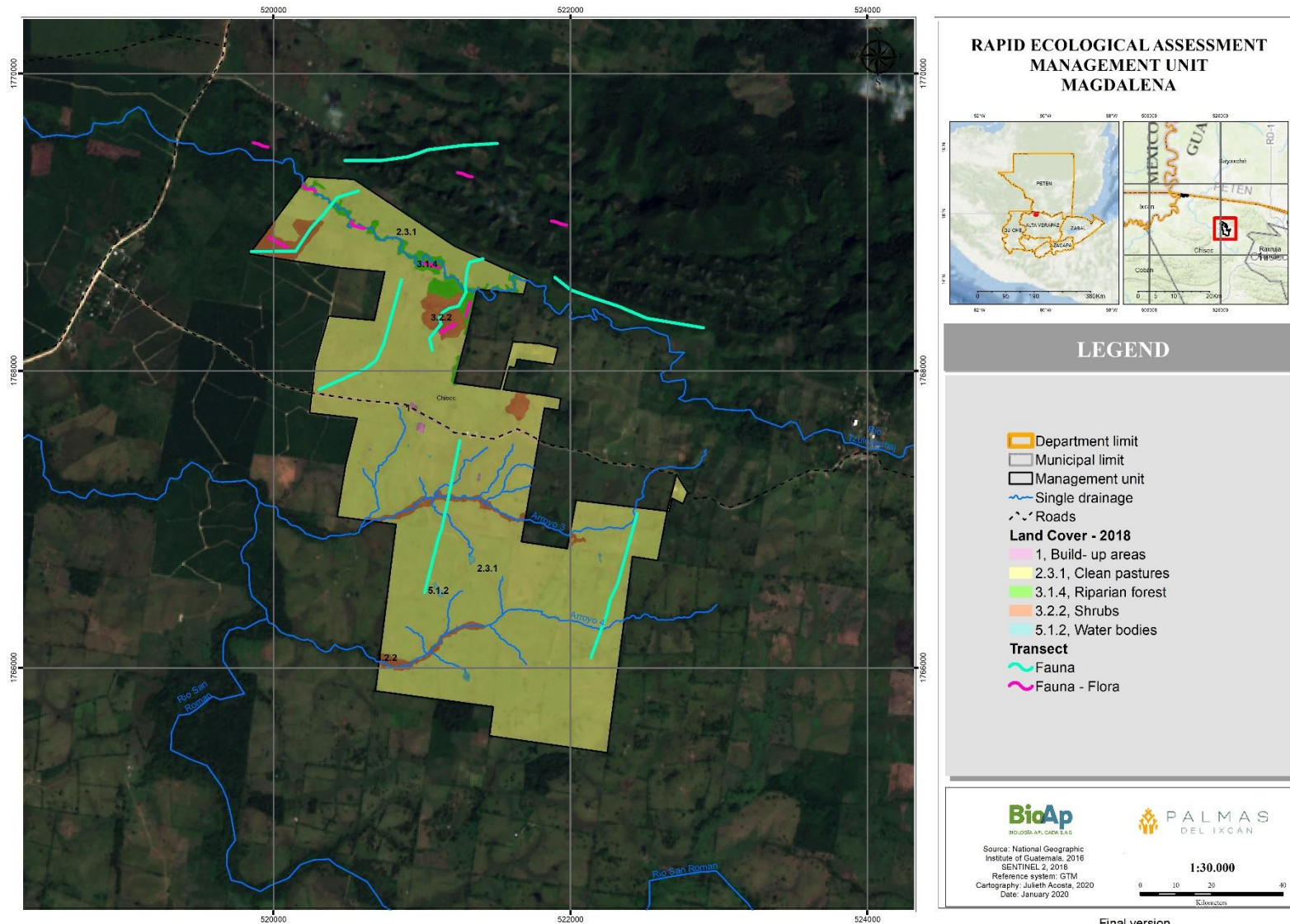
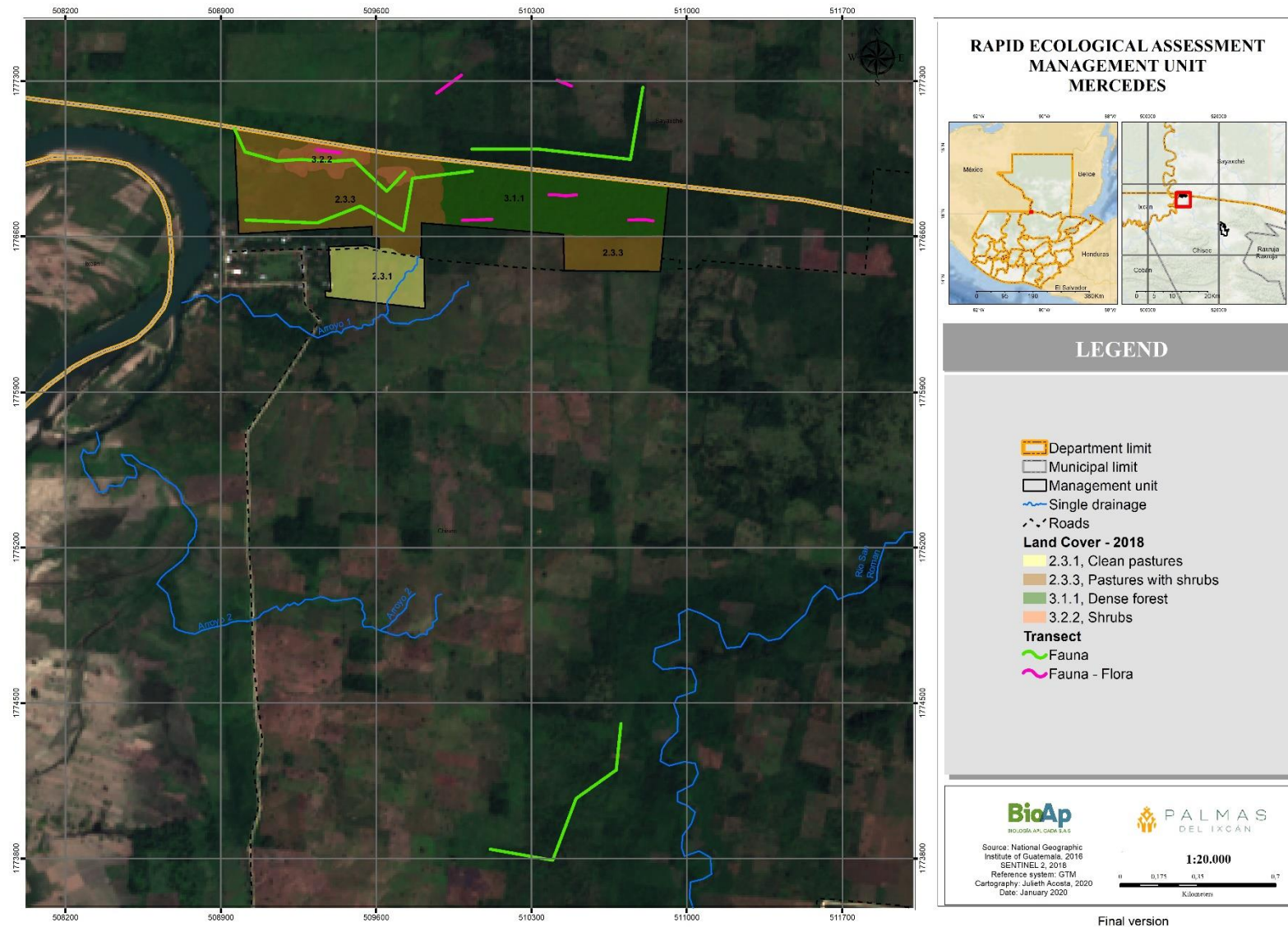*Figure 5. Rapid Ecological Assessment, Magdalena MU.*

Figure 6. Rapid Ecological Assessment, Mercedes MU.

2.4.5 Sources of information on biodiversity, environment, ecosystems and sociocultural component

The collection of secondary information is a fundamental element both in the process of identifying the HCVs in the Management Units and their surrounding areas, and in the identification of the threats to which they are currently or potentially exposed. Therefore, in addition to information collected through field surveys and stakeholder consultation, the information sources presented in *Table 9* were consulted.

Table 9. General Information Sources.

Aspect	Objective
Endemic or RET species	Analyze the presence of Rare, Threatened or Endangered species at the landscape (department / municipality) scale and its category in each of the National (CONAP) and global (IUCN-CITES) sources.
Important Areas for the Conservation of Birds (IBA)	Identify the presence or proximity of the IBAs in the broader landscape context and/or MUs considering BirdLife International's information regarding the Important Bird Areas.
Key Biodiversity Areas	Identify the presence or proximity of biodiversity conservation key areas near to the evaluation areas by means of the KBA information usage
Alliance for Cero Extinction Sites	Identify the presence or proximity of UM or AII to AZE sites, considered as areas in which species identified as endangered or critically endangered are limited, according to information provided by the American Bird Conservancy.
Intact Forest Landscapes	Identify the All and MU presence or proximity to the Untouched Forestall Landscapes
WWF classification ecoregions	Ecoregions threat categorization using the WFF classification list
Biodiversity Hotspots (CEPF)	Identify the presence of biodiversity hotspots in accordance to The Critical Ecosystem Partnership Fund including its threat category of in relation to the ecosystems showed in it.
Archeological Plans	As base information The Municipal Development Plans was consulted
Stakeholders consultation database	Results about the consultation to the stakeholders to identify potential HCV, threats, risks and recommendations for its management and monitoring.

2.4.6 Socioeconomic and cultural component

From the scoping stage and the review of secondary sources, the different social actors that are close to the MU and/or that carry out some type of activities with the communities of the area were identified. Based on the identification, a weighting and prioritization of social actors are carried out using the methodology for the identification and analysis of interested parties, in order to filter and reduce the size of the consultation sample without losing representativeness. This identification and weighting included the following criteria: communities' proximity to the project site, access roads, resources potentially affected, and interest of the communities on the new plantations.

According to the prioritization, three categories of interested parties are established:

- Communities: a population group located in a specific territory, with similar sociocultural characteristics and interests in common, including a diversity of inhabitants (indigenous and mestizo).
- Government entities: these include the state´s monitoring and controlling institutions regarding economic, environmental and health issues.
- Non-governmental entities: companies or organizations that are located in the territory for economic or social purposes.

In summary, the consultation developed by the consulting team to the interested parties, had 230 participants; where 219 members were form communities (Samaria, Serrania de la Bendicion, Yalmachac, Mucbilha II and San Francisco de las Mercedes 2), 4 neighboring producers and 7 representatives of the different governmental entities. It is essential to mention that not all interested parties were approached

due to different restraining situations. In *Figure 7*, *Figure 8* and *Figure 9* show the summary obtained from the scoping process and interested parties consultation is presented.
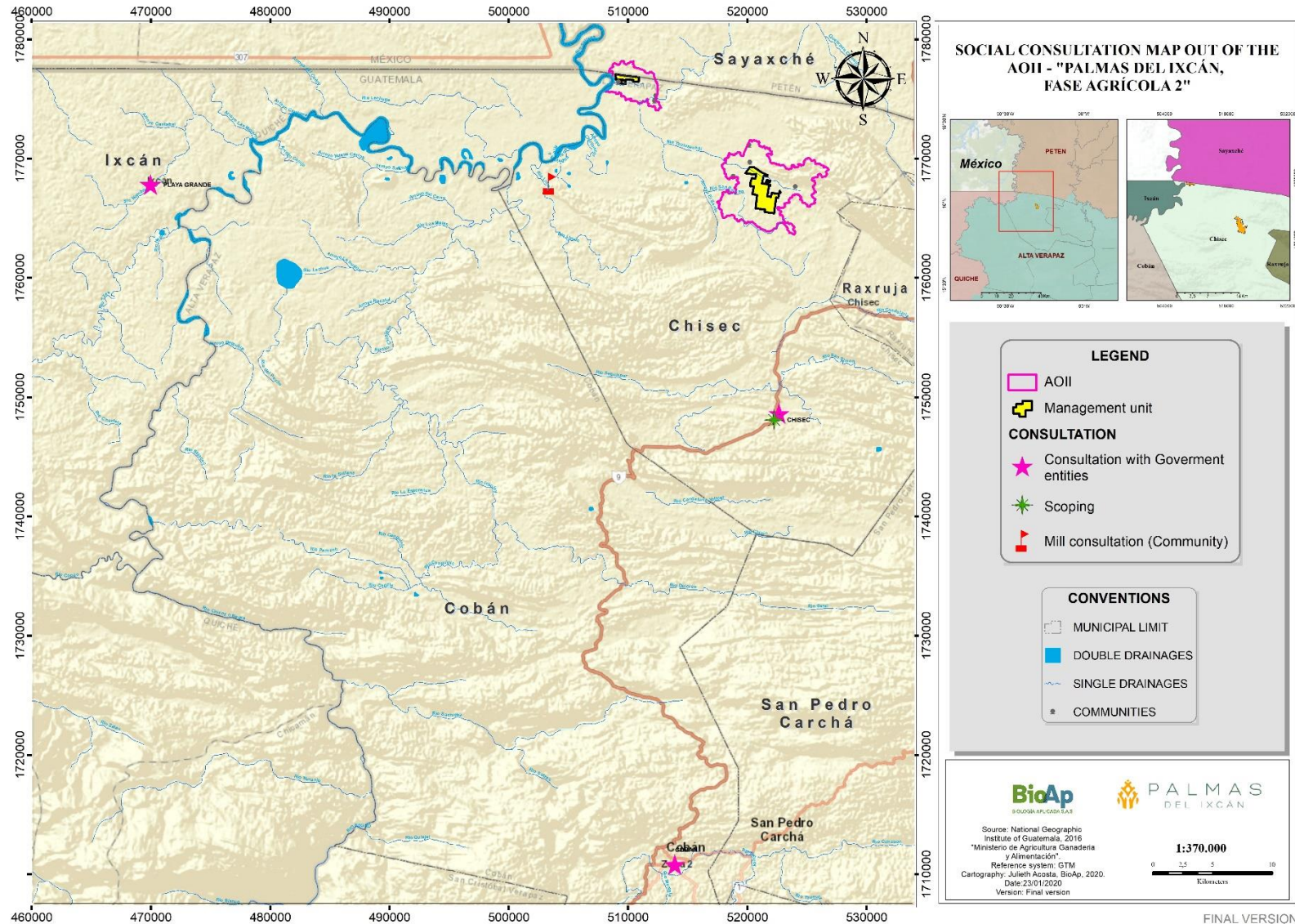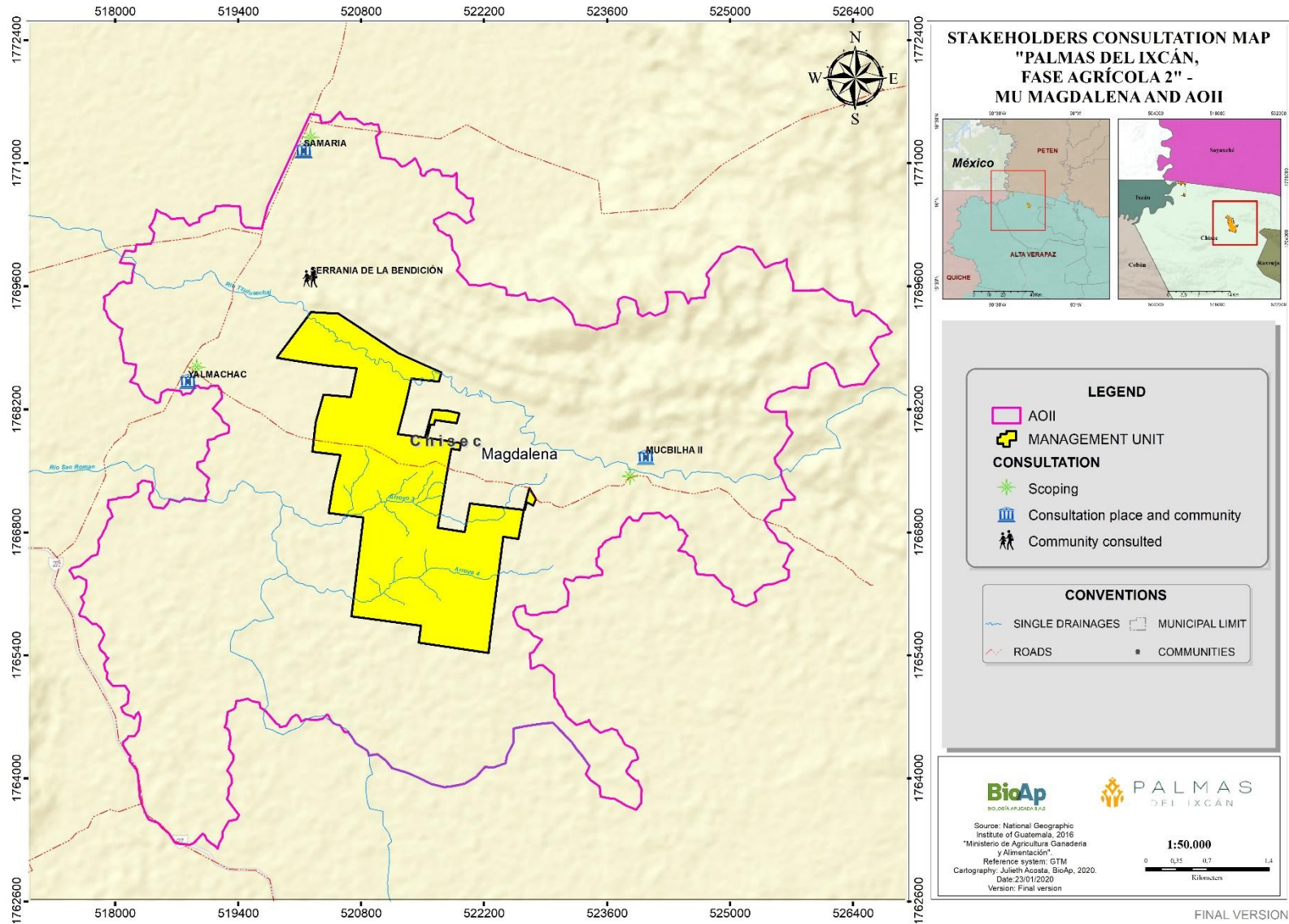
Figure 7. Map of social consultation outside the AOII.

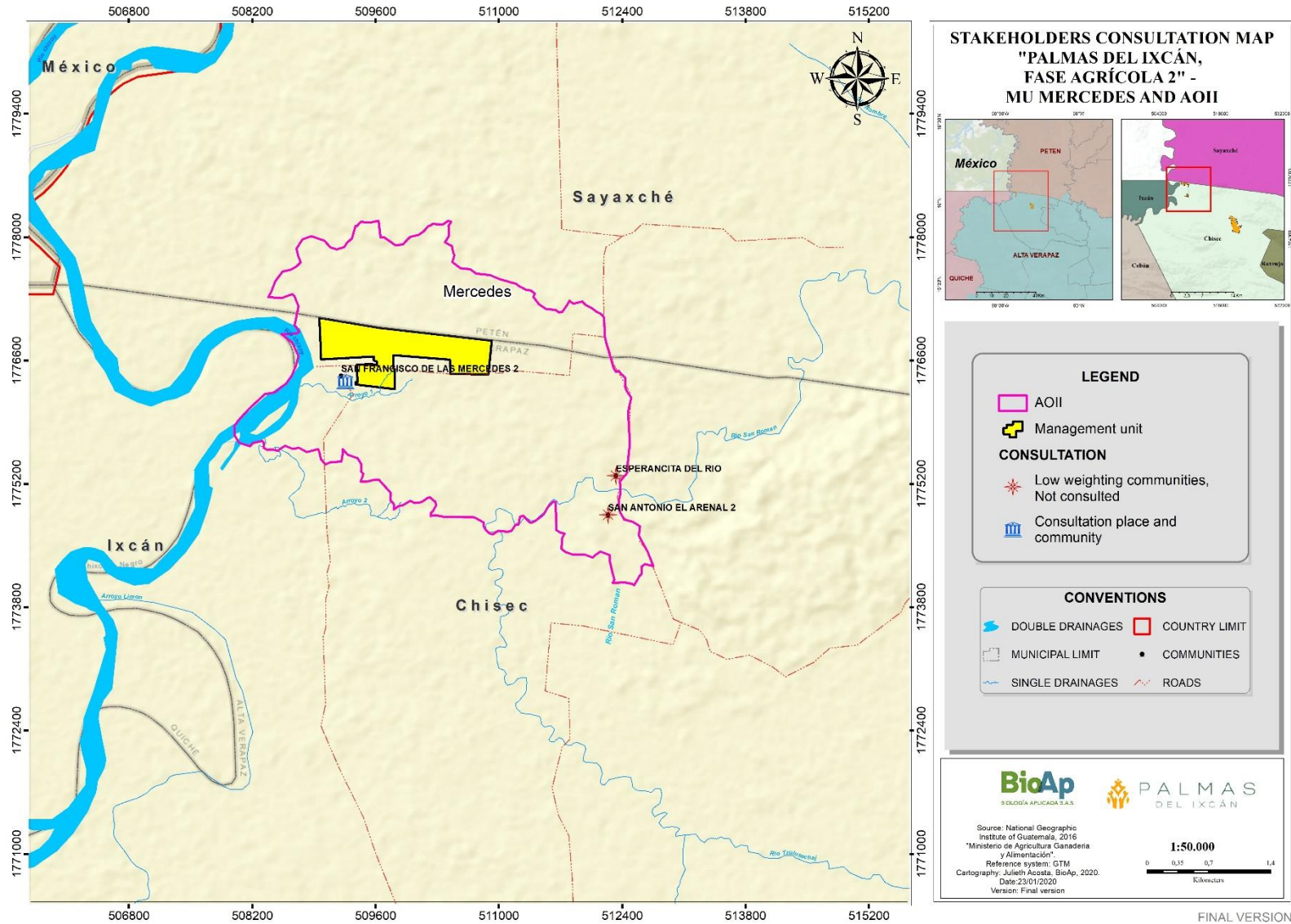*Figure 8. Stakeholders consulted, Magdalena MU and its AOII.*

Figure 9. Stakeholders consulted, Mercedes MU and its AOII.

2.4.7   Final stakeholder consultation

Based on the analysis developed after the field phase, preliminary results of the High Conservation Values study were generated, which were presented to some stakeholders previously consulted, with the purpose of divulgating the results obtained and having a feedback space.

The methodology to approach the parties was generated through a physical invitation to the members of the COCODE of the Yalmachac, Mucbilha II, San Francisco de las Mercedes 2, Samaria and Serrania de la Bendicion communities, as well as to the representatives of the Ministry of Agricultural Affairs and the Ministry of Environment and Natural Resources, with whom the socialization meeting is set.

The communication of results was done through the use of a flipchart presentation for the case of communities and with institutions through a PowerPoint presentation, due to the ease of access to equipment. There, doubts were clarified about the process carried out and the recommendations and suggestions proposed by each interested party were taken.

The main elements, information sources, and criteria for classification and delimitation of the HCVs in the present study are presented below (*Table 10*).

Table 10. Elements, sources of information and criteria for delimiting and identifying HCV.

HCV	Elements	Information sources	Criteria for HCV areas classification and delimitation
HCV 1. Species Diversity	- Rare, threatened or endangered species. - Endemic species.	- Protected area cartography. - Official cartography of ecosystems, land covers and land uses. - Management plans of protected areas present within the broader landscape context. - Important Bird and Biodiversity Areas (IBAs) and Key Biodiversity Areas (KBA). - Field surveys to identify RTE or endemic species with communities and/or government agencies. - Field surveys to identify the current vegetation status - Stakeholders' consultation.	- Forests fragments or patches of well-conserved vegetation, where RTE or endemic species have been registered. - Areas classified as secondary vegetation, shrubs or fragments of nearby forests where RTE or endemic species have been recorded.
HCV 2. Landscape level ecosystems	- Ecosystems and habitats greater than 50.000 hectares. - Ecosystems and habitats under 50.000 hectares that provide connectivity and buffer functions to larger areas. - Intact Forest Landscapes.	- Cartography of land covers and current land use. - Satellite imagery. - Cartography of protected areas, Key Biodiversity Areas and Intact Forest Landscapes. - Stakeholders' consultation.	- Ecosystems and habitats greater than 50.000 hectares. - Presence of ecosystems and habitats under 50.000 hectares that provide connectivity and buffer functions to larger areas. - Presence of Intact Forest Landscapes.
HCV 3. Ecosystems and habitats	- Ecosystems and habitats that are considered rare threatened or endangered.	- Satellite imagery. - Cartography of land covers and current land use. - Ecoregions WWF classification. - Change in land cover and forest cover loss. - Stakeholders' consultation. - Guatemalan threatened ecosystems (USAID).	- Threatened ecosystems or natural fragments that maintain the characteristics of an ecosystem currently in danger or protected.
HCV 4. Ecosystem services	- Critical areas in relation to the water resource flow and quality. - Riparian zones susceptible to erosion. - Riparian areas that provide connectivity.	- Cartography of land covers and current land use. - Interested parties' consultation and participatory mapping with local communities. - Cartography of river basins and sub-basins.	- Identification of riparian areas that provide ecosystem services for regulating the flow and quality of water resources used by local communities. - Riparian areas that provide connectivity between fragments of forest that contain RAP species and/or threatened or endangered ecosystems.

HCV	Elements	Information sources	Criteria for HCV areas classification and delimitation
HCV 5. Community needs	- Water supply for human consumption, and other uses as recreational or tourist. - Hunting, fishing and wild fruit gathering for subsistence.	- Departmental and municipal development plans. - Municipal characterization studies. - Participatory mapping with local communities. - Interviews with government entities and NGOs.	- Water sources within the area of indirect influence. - Traditional economic activities. - Neighbor communities (ladino or indigenous people). - Uses of natural resources (water, fauna, and flora).
HCV 6. Cultural values	- Archeological findings - Sacred places and ceremonial sites.	- UNESCO World heritage registers. - Records of archaeological findings in the Ministry of Culture and Sports. - Departmental and municipal development plans - Research studies (thesis, research). - Maps of registered sacred places. - Participatory mapping with local communities. - Interviews with government entities and NGOs.	- Archaeological sites registered within the area of influence. - Indigenous communities in the area of influence. - Sacred or ceremonial sites of indigenous communities. - Fauna and/or flora used for ceremonial activities.

2.5   Free, Prior and Informed Consent (FPIC)

Free, Prior and Informed Consent (FPIC) is the right of indigenous peoples and other local communities to give or deny their consent to any project that affects their lands, their livelihoods and their environment. This consent should be given or denied freely, that is, without coercion, intimidation or manipulation, and through representatives freely chosen by the communities, such as their traditional or other institutions (Guide on Free, Prior and Informed Consent for members of the RSPO, Nov. 2015).

Respect for the right to FPIC is designed to ensure that sustainable palm oil certified by the RSPO comes from conflict-free zones or land grabs. (Guide on Free, Prior and Informed Consent for members of the RSPO, Nov. 2015). A procedure is required to ensure FPIC whenever companies wish to acquire land to which indigenous people, local communities and other users have prior legal, customary or informal rights. The flow chart for respecting FPIC proposes the main stages of community participation in the search for their consent, in accordance with the requirements of the RSPO standard.
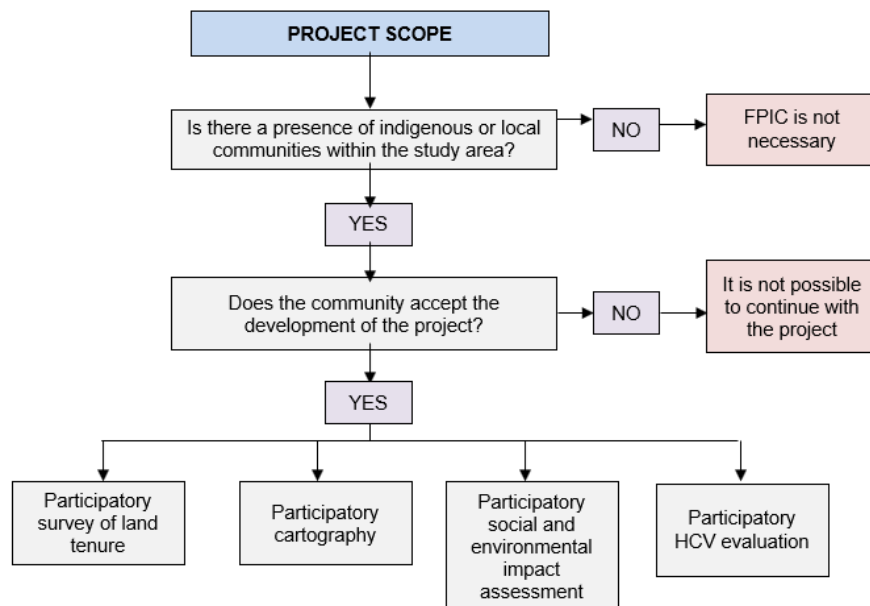

Figure 10. Flow chart summary FPIC.
Source: RSPO, 2015.

2.6   Land Use Change Analysis (LUCA)
The purpose of the Land Use Change Analysis (LUCA) is to determine the degradation of the land and its current conditions. The present evaluation was carried out in December 2018.

2.6.1   Data collection (images, maps and additional documents)

-   ***Landsat images***

Multispectral Landsat images with a resolution of 30 meters were used to interpret the use or land coverage. The images were downloaded from the site: http://earthexplorer.usgs.gov. The land usage classification by Landsat images was performed using "the visual classification" method, which is described below. The specifications of the images used are described in *Table 11.*

Table 11. Satellite images used in the study.

Image	Path	Row	Image date	Strips
Landsat 7	020	049	March 9, 2005	4,3,2
Landsat 7	020	049	July 21, 2007	4,3,2
Landsat 7	020	049	April 24, 2010	4,3,2
Landsat 7	020	049	April 8th, 2010	4,3,2
Landsat 8	020	049	April 11, 2014	5,4,3
Image	Localization		Image date	Strips
Sentinel 2	N0206	R040	March 1, 2019	4,3,2

- ***Google Earth and Bing Images***

In certain circumstances it was necessary to use Google Earth images from 2003-2018 and the Bing images where used to verify the correct interpretation of the cover. This was done with the ArcBruTile application for the ArcGIS software.

Interpretation of satellite images and cover maps creation for 2005, 2007, 2009, 2014 and 2018.

Data gaps in Landsat 7 Images. The Landsat images of 2005, 2007 and 2009 contained an error commonly known as 'spaces', which are invalid data bands caused by faults in the remote sensor components. To complete the information gaps, two or three images were used for each date.

Combination of satellite bands. True color: the band combination was 321. False color: the bands were combined to obtain Landsat ETM + 432 and Landsat 8 543 combinations.

Pan-Sharpened process. The Landsat images were improved by a combination with the panchromatic band of 15 meters per pixel obtaining a multispectral image of 15 meters per pixel. This process was performed using the Create ArcGIS software cached bitmap dataset tool.

Classification of satellite images. The interpretation of the vegetation cover was made within the property areas evaluated by visual classification.

The classification of the cover was made using the adapted Corine Land Cover methodology. In the same way, the interpretation of the Landsat images was adjusted with the information obtained from the Google Earth images.

2.6.2 Land Cover Classification Scheme (compensation coefficients)

The RSPO (Round Table on Sustainable Palm Oil) defined four criteria that should be used when classifying areas that have been cleared for the establishment of palm oil plantations and that lack previous studies of HCV (*Table 12*).

These coefficients or categories are representative of the type of forest / habitat and probable use of land present in areas suitable for commercial palm oil plantations and which, in most situations, can be easily identified through the use of remote sensing.

Table 12. Vegetation Coefficients RSPO Categories.

Coefficient	Description
Coefficient 1.0	Structurally complex forest (including primary forest), regenerated forest, selectively cut with high canopy elements.
Coefficient 0.7	Natural forest structurally degraded but ecologically functional. It includes another degraded but still functional secondary forest of low canopy and a forest in regeneration and forests dominated by pioneers, largely and/or repeatedly cut down or previously burned.
Coefficient 0.4	Multispecific agroforestry.
Coefficient 0	Monoculture of trees and non-tree plantations; another land permanently cultivated, developed or openly degraded.

2.6.2.1 Standardization of the compensation coefficients of the RSPO including plant classification (Corine Land Cover Methodology)

The categories standards (coefficients) used by the RSPO and the coverage classification (Corine Land Cover Methodology), was carried out in order to have greater precision when identifying and classifying the coverage present in the area under study**.**

Table 13 describes the vegetation cover categories used in the Corine Land Cover methodology and its corresponding classification within the RSPO categories.

Table 13. Standardization of RSPO and Corine Land Cover coverage.

Coefficient	RSPO category	CORINE land cover
1.0	Structurally complex forest (including primary forest), regenerated forest, selectively cut showing high canopy elements	*DENSE FOREST:* This cover consists on a group of vegetation dominated by typically arboreal elements that form a more or less continuous canopy and whose coverage area represents more than 70% of the total area of the unit and is five meters higher than the other canopy. These plant formations have not been intervened or their intervention has been selective and has not altered the original structure or functional characteristics.
		OPEN FOREST: This cover consists on plants community dominated by elements uniformly distributed and typically arboreal, forming a discontinuous canopy, higher than five meters and whose area of tree cover represents between 30% and 70% of the total area of the unit. These plant formations have not been intervened or their intervention has been selective and has not altered the original structure or functional characteristics.
		GALLERY AND RIVER FOREST: Refers to the covering of arboreal vegetation located along the banks of permanent or temporary watercourses. This type of coverage has a limited scope as it limits with water courses and natural drainage. When the presence of these forests occurs in the savannahs, it is known as the gallery or glen forest; other forest bands along the watercourses in the Andean zones are known as riparian forests.
0.7	Natural degraded Forest but ecologically functional	*FRAGMENTED FOREST:* Formed by territories covered by dense or open natural forests where HUMAN intervention has been found and whose horizontal continuity is affected by the inclusion of other types of coverage, such as pastures, crops or transition vegetation, which must constitute between 5% and 30% of the total area of the natural forest unit.
		HIGHER SECONDARY VEGETATION: These are areas covered mainly by arboreal vegetation with an irregular canopy and the occasional presence of shrubs, palms and vineyards. This correspond to the intermediate stages of plant succession after a process of deforestation or pastures afforestation. It is carried out

Coefficient	RSPO category	CORINE land cover
		several years after the original intervention, usually after the lower secondary stage. As time passes, you can find communities of trees of a single species or several species.
0.4	Multiespecific Agroforestry	*AGROFORESTERY AND CULTIVATION OF TREES:* Areas occupied by arrangements or combinations of crops composed of different species, together with other herbaceous, shrub and tree species, where the main characteristic of the cover is that the addition of the details does not imply the subdivision of pure units because they combine in the same area, alternating in rows of trees with crops or trees and pastures.
		CULTURE OF NATURAL SPACES AND MOSAIC: Corresponds to covered surfaces which correspond to combined crops and natural spaces, where the size of the property is very small and the pattern of distribution of the lots is too intricate to be represented individually.by cartography. In this unit, the natural spaces are shown as small patches or remnants distributed irregularly or heterogeneously, sometimes is found mixed with cropping areas, which makes them difficult to differentiate. The cultivation areas represent between 30% and 70% of the total unit area. The patches and remains of natural spaces are composed of those areas covered by remains of forest, scrub, gallery and/or riparian forest, secondary vegetation or that show any type of transition, or other areas that have not been intervened or have been minimally modified and still in its natural or almost natural state.
		SECONDARY VEGETATION: Consists of a vegetation cover which results from the process of succession of natural vegetation, and which occurs right after an intervention or destruction of primary vegetation and may be in recovery from its original state. This occurs in cleared areas for different uses, in abandoned agricultural areas and in parts where natural vegetation was destroyed by natural events. There are no elements intentionally introduced by man.
		LOWER SECONDARY VEGETATION: Areas covered mainly by shrubs and herbaceous vegetation with irregular canopy and the occasional presence of trees and vines, corresponding to the initial state of succession of plants after a process of forest deforestation or afforestation of pastures. It occurs after the original intervention and is generally composed of communities of shrubs and herbaceous vegetation consisting of many species.
0	Trees monoculture and no arboreal plantations, other land cultivated permanently, developed o degraded open	*FOREST PLANTING:* Cover consisting of arboreal vegetation plantations, created by direct human intervention for forest management proposes. During this process, the forest stands, established by planting and/or sowing during the afforestation or reforestation process, are created for the production of wood (commercial plantations) or environmental goods and services (protective plantations).
		CLEAN PASTURES: This cover includes clean pastures with a percentage of coverage greater than 70%; management practices (cleaning, liming and/or fertilization) and the level of technology implemented prevent the presence or development of other covers.
		TRANSITORY CROPS: Includes the areas occupied by crops whose vegetative cycle is less than one year and lasts only a few months, such as cereals (corn, wheat, barley and rice), tubers (potatoes and cassava), oil seeds (sesame and cotton), most of the vegetables and some species of outdoors flowers. They share the basic characteristic after harvesting it is necessary to sow or plant to continue producing.
		PERMANENT CROPS: Includes areas dedicated to crops with a vegetative cycle of more than one year, producing several crops without having to replant; this category includes herbaceous species

Coefficient	RSPO category	CORINE land cover
		such as sugarcane, panela, banana, plantain, shrub crops such as coffee and cocoa; and tree crops such as palm oil and fruit trees.
		DEGRADED OR NAKED TERRAIN: This cover corresponds to areas of land devoid of vegetation or with a scarce vegetation cover due to natural and anthropogenic events such as erosion and extreme degradation and / or extreme climatic conditions. This includes areas where the land is salinized as in the desertification process or where intense erosion has occurred, and may even result in the formation of ravines.
		WOODED PASTURES: The cover includes pastures in which pastures with trees that have more than five meters long have been disseminated. Tree coverage should be more than 30% and less than 50% of the area covered with total grass.
		PASTIZALES: The cover consists of a vegetal community dominated by typically herbaceous elements developed naturally in different densities and substrates, forming a dense cover (>70% occupation) or open (30% - 70% occupancy). An herb is not lignified or hardly lignified, giving all its organs a soft consistency, and can be found both, underground. These plant formations have not been intervened or their intervention has been selective and has not altered the original structure and functional characteristics.
		URBANIZED AREAS, INDUSTRIAL OR COMMERCIAL AREAS AND COMMUNICATION NETWORKS, MINING OR DUMPING AREAS.

In summary, the coverage standardization is as follows (*Table 14*):

Table 14. General standardization of the RSPO and CORINE Land Cover coverage.

Coverage	RSPO coefficient
RIPARIAN FOREST	1
DENSE FOREST	1
CROPS	0
FLOODED PASTURES	0
INFRAESTRUCTURE	0
PALM OIL	0
WOODED PASTURES	0
GRASSLANDS	0
CLEAN PASTURES	0
VÍAS	0
RÍVERS	0
URBAN AREAS	0
OPEN AREAS	0
SECONDARY FOREST	0,7

2.7   Soils and slopes suitability studies

The Suitability of Soils and Slopes Study allows to identify those areas presenting marginal and fragile soils, as well as those areas with sharp slopes for sowing. Fragile soils include peat soils, mangroves and other areas of humus, while soils considered marginal or problematic may include sandy soils with low organic matter content and potential or currently acid soils; likewise, excessive inclination refers to areas with slopes greater than 25 ° (RSPO, 2013). This study was developed in December 2018.

The digital elevation model with a resolution of 15m was used to carry out the slope analysis procedure in order to represent the terrain as detailed as possible. This variable is highly reliable when subjected to a geomorphometric and hydrological analysis of the terrain is performed (Jordan, 2008).

The slope is a determining factor in land analysis; the inclination and the form are variables that are extracted from the DEM (Digital Elevation Model) using algorithms such as horn (Chan, K, 2004), which the influence of the eight cells neighboring the central pixel in a 3x3 matrix using ArcGIS as tool. Once the slope map was obtained and classified, it was reclassified into 9 classes, ranging from 0 ° to 90 °. The processing was carried out in the ArcGIS software in an ESRI-licensed desktop (Version 10.5).

The data of the digital elevation model demos (IGAC, 2011) is used to represent a hydrological model (flows and connectivity), erosion (slopes, curvatures, etc.) and sedimentation zones for the extraction of drainage areas and the topographical parameters, as well as to obtain results for the establishment of land usage.

The construction of a shadow map was carried out and processed for the base mapping after performing a survey analysis to determine inclinations. The processed DEM was digitized to determine the amounts of slopes in the areas and, finally, a graphical output was generated. Derek (1972) and Marsh (1979) determined the elevations standard in where indicates which are the reclassified slopes. This model shows that a slope higher than 25 degrees is very high and, therefore, the plantation of forest crops is problematic. Runoff or percolation are factors that may be associated with this concept. On the other hand, the inclinations between 0 ° and 10 ° represent slight to moderate slopes which are optimal for developing this type of activity.

Information regarding soil types and river corridors was used in the construction of the final map to correctly describe the land.

The topography is characterized by angles of inclination and by its length and shape. Topography is an important factor to determine the soil erosion, erosion control practices and the possibilities of mechanized tillage. It also has a primary influence on the capability of the land to be used for agricultural means. The greater the angle of the slope and the length, the greater the level of soil erosion. An increment in the angle of the slope causes a greater runoff velocity and, therefore, the kinetic energy of the water causes more erosion. Longer slopes lead to a runoff intensification that slows down its volume and causes an increasingly serious case of erosion. In addition to erosion problems, areas with sharp slopes also show lower potential for agricultural use. This is due to the greater difficulty or impossibility of mechanical tillage use or transport difficulties inside or outside the field. In these cases, tillage may also be limited by the presence of surface soils.

The following diagram (*Figure 11*) indicates the procedure for topographic or slope analysis. For the construction of the final map, processed information of soil type and water rounds was taken to accurately describe the areas for crops usage.
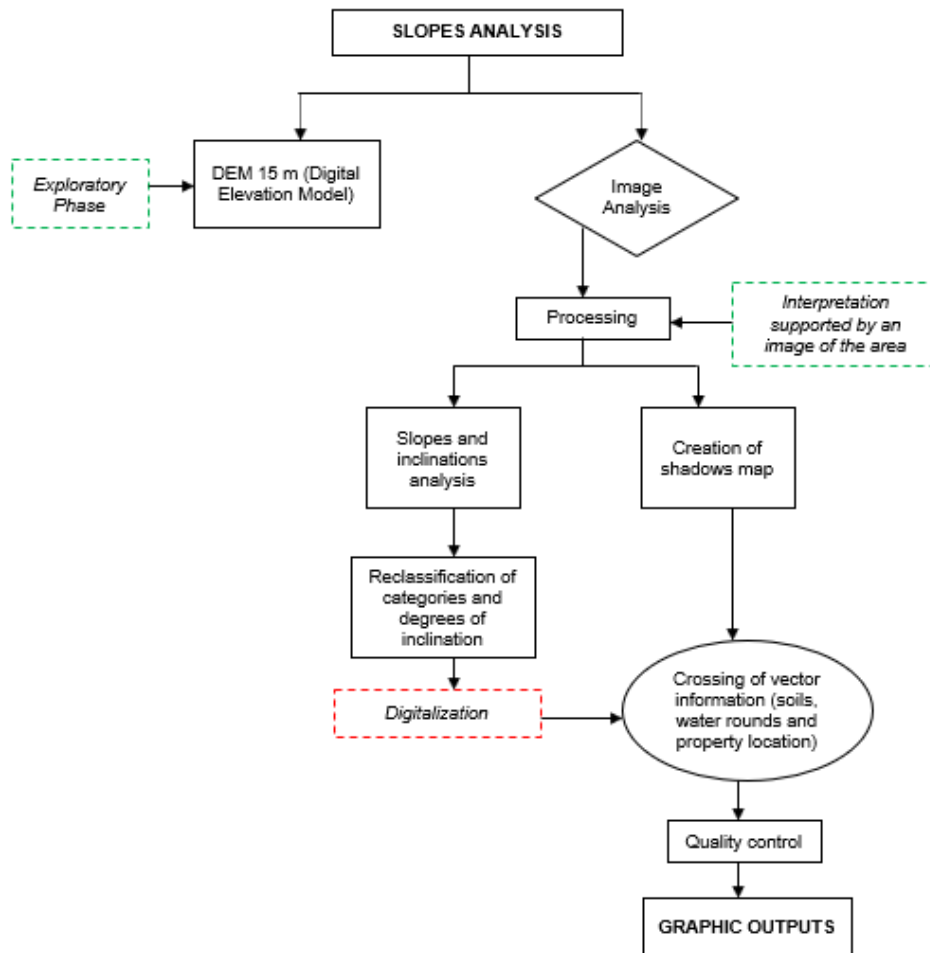
Figure 11. Flow chart for topographic or slope analysis.
Source: BioAp S.A.S., 2018.

2.8 High Carbon Reserves and RSPO Greenhouse Gases (GHG) Assessment Procedure

The purpose of this evaluation is to estimate the carbon reserves in the present coverages and quantify the emissions which come from specific activities. The present evaluation was carried out in December 2018.

2.8.1 First stage: elaboration of formats for primary information collection
In this stage, the elaboration of the formats to gather information was carried out. This was developed under the parameters that RSPO evaluates in order to reach the highest possible precision in the calculation. For the emission factors, the data provided by the company Palmas del Ixcán was taken in order to perform the modeling and estimation of GHG in the new palm oil plantations.

2.8.2 Second Stage: Primary and secondary information verification and analysis
Once the primary information has been collected through the mentioned formats, all the expected inputs and outputs of each unit process involved in the life cycle are systematized, the possible impact that will be generated at the time of completion. The new plantations, as it is based on the LUCA study, where it is evaluated the types of vegetation are present in the study area.

2.8.2.1 Recognition of images

For the coverage and biomass estimation, satellite images were used as base information for this analysis. This was supported by the coverages official vector documentation which can be found in the National Geographic Institute digital resources of Guatemala (IGN); the processing of the information was carried out under the ArcGIS ESRI license (Version 105), Quantum GIS (QGIS desktop version 2.12.1) and ERDAS IMAGINE.

Satellite images are one of the most accurate resources to be used in order to obtain conclusive results in order to take right decisions. SENTINEL 2 images were used, which are the main Source of analysis to corroborate and update coverages. This process was taken under the concept of visual interpretation and band mapping. The method was divided into 2 phases (interpretation, verification, analysis and digitization).

- Phase 1: Interpretation and verification: Management areas interpretation were analyzed using SENTINEL 2 images from 2018, with a resolution of 10m for 2, 3, 4 and 8 bands. These bands were compiled into an image and structured in a mosaic over the general management area. For the interpretation, combinations of bands were made allowing to determine types of coverage and its status. The images where supported as already described above using data of coverage and land use vectors of the IGN. Likewise, the coverages in the field, some geographical accidents, structures and constructions were corroborated, georeferenced and documented.

- Phase 2: Analysis and digitization: All the information was organized and analyzed altogether. First, a visual interpretation was performed on the images, superimposing the coverage and of land usage profile verification points. This process was carried out making combinations of each band. *Table 15* shows the spectral bands used by the SENTINEL 2 sensor. For the interpretation, the 3.2.1 combinations of natural color and 4.3.2 were used for the infrared evaluation.

Table 15. Description of spectral bands included in the SENTINEL sensor.

Satellite Image SENTINEL 2	Bands	Wave length (micrometers)	Resolution (meters)
	Band 1 – Coastal spray	0.443	60
	Band 2 – Blue	0.490	10
	Band 3 – Green	0.560	10
	Band 4 – Red	0.665	10
	Band 5 – Near infrared and Visible	0.705	20
	Banda 6 – Near infrared and Visible	0.740	20
	Banda 7 - Near infrared and Visible	0.783	20
	Banda 8 - Near infrared	0.842	10
	Banda 8a - Near infrared and Visible	0.865	20
	Banda 9 – infrared Short wave	0.945	60
	Banda 10 – infrared Short wave	1.375	60
	Banda 11 – infrared Short wave	1.610	20
	Banda 12– infrared Short wave	2190	20

Source: IGAC 2013.

Finally, the vector layer was digitized per Management Unit and the value for each type of coverage was determined. The entire process was carried out in a geographic database.

2.8.3 Estimation of Carbon Reserves

The natural and artificial coverings behave as natural carbon reservoirs, which has been fixed as a result of photosynthesis performed by plants, through which the carbon dioxide is absorbed and transformed

into organic material or biomass. Depending on the type of cover and the plant stratum to which each species belongs defines the proportion of biomass that is accumulated in each coverage (Greenpeace, 2013). *Table 16* shows the proportion of carbon fixed for each coverage according to the RSPO Procedure Guide for Evaluation for New Developments in 2016.

It is important to know that there are five carbon deposits (aerial biomass, underground biomass, dead wood, waste and soil organic matter) as defined by the Intergovernmental Panel on Climate Change (IPCC). However, applying the established by RSPO, this assessment only needs to have information regarding aerial biomass (AGB), underground biomass (BGB) and soil organic matter.
.
If the default AGB and BGB values and the predetermined RSPO soil cover classes are used, there is no need to conduct field sampling and the PalmGHG Calculator could calculate emissions based on soil cover classes present and the size (in hectares) of each land cover class (RSPO, 2016).

Table 16. AGB and BGB defaults of the RSPO (tC / ha) for 6 soil cover classes.

No.	Class of Vegetal Coverage	Value by default (tC/ha)
1	Intact Forest	268
2	Disturbed Forest	128
3	Arboreal crops	75
4	Grass lands or Shrubs	46
5	Crops for food	8.5
6	Pastures	5

Source: RSPO, 2016.

2.8.4 GHG Emissions Estimation

Once the information requested above is available, the New Development GHG Calculator spreadsheet will open. For this study the Spanish version was downloaded, however, it is worth mentioning that for any case the information to be filled out is the same. In this spreadsheet, 16 tabs are presented, of which 7 must be completed (RSPO, RSPO GHG Assessment Procedure for New Development Version 3, s.f.).

LUC Emissions	FFB Production	Fuel	Peat	Fertilizer and N$_2$O	Conservation area	Mill data

The given information corresponds to the performance and production values expected for new developments. In the summary tab of results the following information must be presented:

- Emissions and field sinks for small producers.
- Drainage emissions and field for use in large-scale operations.
- The emissions generated in the Mill.
- Total emissions, tCO2e (field and Mill)

Next, a step by step description of the execution of the calculator is made.

a) LUC Emissions: In this tab of diligence, the information on the areas that will be cleared for the establishment of new plantations, as well as the estimated carbon reserves in the existing soil cover. If carbon stocks were estimated using indicators, by the use of the default values provided in the RSPO GHG Assessment Procedure, then the list of default values provided in the same tab can be selected. However, if measurements were made in the field, the type of soil cover and the corresponding carbon reserves must be defined (filling the yellow cells).

b) FFB production: The expected tFFB / ha yield for the new palm oil developments must be entered. It is important to keep in mind that the data for the planted area is automatically entered by the same tool, therefore the LUC tab must be completed.

c) Field fuel: The expected annual fuel consumption is indicated, which should include the transport of the FFB to the Mill, the transport of RFV and / or fertilizers to the field, transport of workers and materials, operation of machinery, such as spreaders of fertilizers, pumps and turners of fertilizer, and maintenance of infrastructures such as roads and drains for the own culture of the Mill. The fuel used for land clearance activities (in preparation for the new plantation) is excluded.

d) Fertilizers and N_2O: You must enter the expected annual fertilizer consumption, for this data you can make an average of the annual use of fertilizers that are being applied in the company´s plantations. This sheet calculates the total CO2 produced from the manufacture, transport and use of fertilizers. The N2O produced from the application of fertilizers in the field of RFV, credit and POME is also calculated. The tool provides a list of simple fertilizers, however, for compound fertilizers, each user must first add it to the "Fertilizers defined by the user" sheet. Emissions from the manufacture of compound fertilizers can be estimated using the "User-defined fertilizer" sheet.

e) Seq. conservation areas: In this tab it is necessary to enter the total conservation areas, taking into account the conservation areas established for each scenario and also the areas identified as HCV, once you have the total area it is important that the equation is made to determine the tC and in this way enter it in the average Cseq, this is done to calculate the emissions of the entire conservation area (ha). The default Cseq rate of the RSPO is provided in the same tab. You can use the customized regional / national / local Cseq rate by providing references to that rate.

f) Mill's data: It is necessary to point out that if the new development does not include operations of Mill, it will not be necessary to enter data in this sheet. However, for the company Palmas del Ixcán, if it applies since it is planning to send all the fruit that is generated from the new developments, to its respective Mill, therefore, the projected data should be indicated, as soon as to CPO and PK production (t / year), the estimate of methane production from POME and the fuel consumption in the Mill as well as the electricity consumption of the network. Depending on the scenario, an estimate is made for the capture of methane for the burning or generation of electricity, or if none of these processes is done, it is left to be sent to the ponds and perform the conventional procedure.

3 SUMMARY OF FINDINGS

3.1 Social Impact Assessment (SIA)
3.1.1 Stakeholder consultation findings

The information presented below corresponds to the fillings for each of the addressed social actors. Their perception of the socioeconomic conditions of the communities in the project´s area of influence; therefore, the representation of the reality of the study area is determined by the subjectivity (experience and perceptions) of the participants. Thus, each of the interested parties is involved in a general category (Community, Government Entities, Social Organizations and Collaborators) for a better understanding of the results.

Table 17. Summary of findings of stakeholders consultation.

Stakeholder	Comments	Social aspect
Genaro Caal Chu Neighbor	The approach made with Mr. Genaro, neighbor of the MU of Magdalena, exposes that the community requires employment, and thinks that it is necessary that the company Palmas del Ixcán hires personnel from the area with the aim of improving their living conditions. And which it is clear that the type of work varies according to the productive stage of the crop. In addition, he says that in the community there is a need for training of its inhabitants to be able to access this type of employment. Regarding the conditions of the community he states that there is a high demand for firewood, as it is the only mechanism for cooking their food and that many people have no land access for this resource in the vicinity of the intended MU for new plantings palm oil Similarly, it expresses that malnutrition occurs in children, due to the lack of access to resources of parents and the low productivity of the soil, so that children do not reach to exceed the minimum education. Regarding the crops, it was exposed that there are negative perceptions about the cultivation of the palm oil, referring to the contamination and loss of water; Likewise, it reports concern for the reasons for the opening of a new route of entry and mobilization to MU Magdalena, which implies the loss of communication and direct relationship with the company, and the benefits for the community. Finally, it suggests that alliances have to be created between the community and nearby companies (palm trees and hydrocarbons) for the construction of a recreation center.	Employment Generation
		Make relationship with the community
		Access to basic needs
		Job training
		Perceptions and expectations
		Access to cash Income
		Support the community
		Change on transit route
Company Entrepalmas	Entrepalmas administrator says that it is a great opportunity the plant palm oil by the company Palmas del Ixcán, since it generates employment for nearby communities especially with the Yalmachac Village. In addition, it allows to generate alliances between companies to maintain the road towards The Mucbilha II Village. In addition, he states that it is necessary to maintain good communication and relationship with the members of the COCODE of each community, since the population is conflictive and can cause problems by blocking roads or eve inside oil-palm crops. Finally, he states that in the communities supports to the community are made seeking improvement of living conditions.	Support the community
		Make relationship with the community
		Roads maintenance
		Employment generation
		Access to cash Income
Guillermo Sacul Neighbor	During the interview Mr. Guillermo Sacul raises three suggestions: • Fist of all that the company Palmas del Ixcán allows to continue having access to the roads inside the Magdalena MU, which are traditional and also simplify access to the terrains, located near the Tzulusechaj River. • Secondly, that in the establishment of palm corps, water sources must be respected, meaning no contamination by the use of fertilizers or chemicals should appear, since the Mucbilha II community depends on it and also the plots are supplied with water for agricultural activities. He considers that if he is affected by the company it would be a reason to sell his land. • And third the company Palmas del Ixcán support the maintenance of the only access road to the community of Mucbilha II, since this will be equally useful for the transport of the fruit and workers.	Roads maintenance
		Make relationship with the community
		Access to basic needs
		Roads access
		Cash income access
Samaria y Serranía La Bendición Communities	The meeting with the COCODE members (The Samaria and Serrania de la Bendicion communities) allowed to identify perceptions regarding the establishment of new palm crops in Magdalena´s MU. First of all, the COCODE members mention their concern regarding the possible water sources contamination, since they	Access to basic needs

Stakeholder	Comments	Social aspect
	know cases of this kind of companies which have caused loss of species and death of fish, due to the applications of agrochemicals and fertilizers, affecting food supply and the use of the resource. To avoid or prevent this problem, it is suggested to carry out an inventory of each location of water sources found in the area, and in that way, protect them by planting or replanting on them.	Make relationship with the community
	In addition, the participants express the possibility that crops and animals are affected by the presence of pests brought by the coping. However, it is recognized that these comments are subject to ignorance of the internal management of the palm cultivation developed by the company; therefore, they suggest that information and training activities be carried out to avoid opinions that affect the company, consequently, the generation of conflicts.	Job training
		Employment generation
	Regarding the benefits, they recognize that the establishment in the area of new palm crops allows will allow the inhabitants to obtain income from employment, therefore, they suggest that people from the area be trained and employed, taking into account to women as a workforce.	Support to the community
San Francisco de las Mercedes community	The approach with San Francisco de las Mercedes inhabitants was carried out in two main stages: the first one with the COCODE members and the second, with the area´s inhabitants. These two meetings allowed to collect their perceptions and thoughts, which are expressed below.	Employment generation
		Labor inclusion
	They mention their agreement about the establishment of palm oil crops in the area, since there is a need for employment and this project meets these requirements. However, they are concerned about the presence of pests such as flies or butterflies, since the crop will be very close to the village; therefore, a special control and management of these pests is suggested. In addition, they express their concern about the possible contamination of water sources, since the use of agrochemicals and fertilizers, and the connection with dams puts at risk the quality of the resource; therefore, they recommend generating forest strips for water protection, especially a birth that is inside the Mercedes MU from which the community is supplied since they do not have an aqueduct.	Plagues and disease presence
		Accident prevention
		Support to the community
		Roads access
	Likewise, they comment that within the agreements with the community during the purchase of land it was proposed that the parcels near the MU could make use of the alternative roads that the company has to build. Likewise, the need for support in road maintenance is indicated. It is important to clarify that these roads are the only way of moving around the municipality of Chisec.	Road maintenance
		Communitarian participation
	Regarding the suggestions made, they suggest the possibility of support of Palmas del Ixcán to the community into educational and health issues, as well as integrating the community in aspects such of palm oil cultivation, as long as it is the presence of the community and is within the scope of it.	Access to basic needs
		Built relationships whit the communities
Mucbilha II community	During the General Assembly with Mucbilha II village, a first dialogue was held, in which the community expressed its concerns and opinions which are expressed as follows	Access to basic needs
		Roads access
	• Fear for the opening of a new access road, since this could generate insecurity for the population.	Support for the community
	• They recommend that the company Palmas del Ixcán support the road maintenance allowing access to neighboring properties along the traditional road.	Variations in Natural resources
	• They recommend that crops should not be connected to the streams, since they affect the resource water, reducing its flow and increasing the contamination with agrochemicals.	Labor inclusion
	• They comment that the community would not agree with the establishment of Mill, since it is much more	Cash income access

Stakeholder	Comments	Social aspect
	contaminated and would affect the population. • They suggest that the company Palmas del Ixcán should support the community with medicines and also work for women inclusion. In the second stage, two activities are developed: Social cartography and the Threats and Opportunities Matrix. During the activity of social cartography, the recognition of the territory dynamics, while in the activity of the matrix the following was linked: Threats: Handling money made poorly, lack of water, family breakdown, presence of drug addicts, workers lack of participation, possible risks of raping women, and loss of wildlife. Work opportunities for inhabitants, housing proximity, monthly income, families and community suppuration. Some agreements generated are about the company efforts to develop the process of hiring people from the community only if it has the endorsement of the COCODE.	Presence of social and economic (alcohol, drugs, rape, common delinquency) Road maintenance Communitarian Participation Local economic growth Jobs creation Communities Relationship
Yalmachac Community	The meeting with the Yalmachac Village was carried out through a workshop, in which two groups were formed. In the first one social cartography was developed, by its use it was possible to identify important aspects of the community. For the second group, a matrix is constructed. In the matrix threats and opportunities are raised with the establishment of palm oil crops. These aspects are explained below: Opportunities: Access to employment and income, support for the community. Threats or Fears: Presence of pests such as flies or butterflies, lack of water, loss of forest cover due to deforestation, labor exploitation, damage to other nearby crops, loss of wild life. Suggestions. - Protect the water sources that are inside the MU Magdalena, through reforestation and non-application of agrochemicals nearby. -Regulation of vehicle traffic to avoid accidents and maintenance of roads. -Support to the community in health and education issues. -Free access to neighboring territories that require to move inside their farms. -Support in case of a community emergency. -That there is no labor exploitation or mistreatment by the managers.	Natural resources variability Road access Relationship whit the communities Support to the community Plagues and disease presence Labor creation
Yalmachac y Mucbilha II community	In the approach process within the communities, 63 surveys where applied to the inhabitants of Yalmachac and Mucbilha II communities was developed. The results showed very important information. . a) Recommendations for the Company • Conserve the river, streams and other water sources and natural reserves. Since the supply sources could be contaminated by water overflow from the plants during rainy seasons, especially in the plot 31. This is also the case with gutters, which carry the rivers of pollutants that are swept from the interior of plantations. •Take into account the professionals of the community to provide employment. •Control fly plagues, which not only affects humans health, but also their livestock. •Consider older adults, when assigning heavy work. b) Requirements	Support to the community Plagues and disease presence

Stakeholder	Comments	Social aspect
	• Install a health post, which will provide the free consultation service and medicine donation. • Support the development of the community with new infrastructure and/or urbanization projects, health, education (donation of desks for the school) and technical assistance in the agricultural issue to improve their cultivation practices.	Natural Resources variability
		Jobs creation
	c) Concerns • If the Company cuts down trees, it will be difficult for them to obtain firewood in the future. • They are aware that palm plantations are protected with rat poison, and some pigs have died by eating that poison by mistake. • The employment that the Company provides is temporary, (they are hired only for 3 months). • Some think that it is possible to stop raining due to palm plantations. They even indicated that, in meetings held in Chisec by organizations in Huehuetenango, they were informed that the palm tree dries streams. d) Opinions • Some find this Project positive, because the community has water despite the proximity of the palm plantations; there are also more local employment opportunities, thus avoiding migration. For example, the daily wage is Q40.00 or Q50.00 per day, in the cultivation of cardamom.	
Las Mercedes I community	The approach with Las Mercedes I community takes place in 2017, and a record of the activities was generated, reflecting some of the population's perceptions regarding the new palm oil plantations. These are their opinions: - The need for labor inclusion for young people is considered, since it is difficult for older adults to access employment. - Report the importance of not hiring people outside the community, in order not to generate conflicts within the community. - It is expected that access by the roads to other territories will not be prohibited. - Support to the community in terms of health.	Job generation
		Labor inclusion
		Road Access
		Support to the community
Chisec Health District	The meeting held with the District of Health representative of Chisec allowed to know about the environmental management at a local context, their conflicts with current companies and the living conditions in the area. In the meeting he states that within the area there can be found multiple social problems, including high mortality of pregnant women and children, high birth rates, child malnutrition, psychoactive substances usage, teenage pregnancies and common delinquency. This is mainly caused due to the cultural conception in which still prevail predispositions to conventional medicine, little budget for education, home services and health, likewise the lack of employment and income, presence of illegal groups in the area (drug trafficking) and inadequate waste management promoting targeted pollution in homes. On the other hand, regarding the establishment of new palm oil crops, the most common fears in the communities are the contamination and modification of rivers course, the presence of flies, soil productivity, fish mortalities and an increase in the alcohol content. Therefore, it suggests to follow the norm and agreements in that are established with the communities and maintaining a good communication with the COCODE.	Presence of social and economic (alcohol, drugs, rape, common delinquency)
		Natural Resources variability
		Plagues and diseases presence
		Natural resources variability
Secretary of Agrarian Affairs	The dialogue with Chisec´s SAA officials was generated around several topics, with special emphasis on the legality of land and changes in land use. There the officials identify that the access route to the MU and the	Road Access

Stakeholder	Comments	Social aspect
	Chinajá mountains are important for the community, as well as the access routes to neighboring properties, which was also manifested in previous meetings.	Road maintenance
	They mention the importance of providing legal clarity to parcels 10 and 11 on the MU Magdalena, since the entity has not been declared ascribed to the community. Moreover, they comment that the area of influence of Magdalena MU has claims processes for land which makes it a conflict zone. Due to this reason work must be done with the Secretariat to mediate the conflict, determining methodologies that allow the peaceful solution of the situation.	Land legality
	On the other hand, they mention that within the communities there are wrong concepts regarding the cultivation of palm oil, given the cases presented with other companies in the area since they have contaminated water sources for human consumption, due to the agrochemicals used to the crops. They also report that the use of chemicals connected to water sources, affect communities as they cause flooding both in the villages and in the neighboring plots. For this situation, they suggest developing a mapping of the possible communities that may be affected by the use of water sources such as the San Román River and the Tzulusechaj River.	Relationship with the communities
	In addition, they state that the communities surrounding the MU Magdalena have the use of easements of passage not established in the registry of the municipality but that they are traditional, which causes problems for the access and respect of private property. Therefore, they suggest establishing agreements regarding the access and use of internal streets taking into account the needs of the population and the safety of palm oil cultivation.	Natural Resources variability
Ministry of environment and natural resources of Guatemala	The approach established with The Ministry of Environment and Natural Resources delegate in Cobán, reflects a high concern about the territory's environmental situation, due to the agricultural frontier expansion and the inadequate land use. This is linked to the high deforestation of mountains and protected areas, pollution of water sources (San Román, Tzulusechaj and Chixoy rivers).	Land usage change
	The delegate mentions about the affectation of water sources by the use of agrochemicals in the palm cultivation process, in this case the community blames their use to these companies and the Ministry of Environment for low performance in their actions, however, reports that companies fulfil the norm and that is the community which does not understand that it is due to an inappropriate. use of land	
	He reports that there has been a loss of species, especially fish, an example was in the community of Esperancita del Río, where there was an affectation in the fish; therefore, it recommends respecting the biological corridors and gallery forests near the streams.	Natural Resources variability
	Finally, he states that there have been problems with the neighbors to palm oil crops, since they are subject to sabotage in which they damage the trees to obtain firewood for the cooking of food, as well as develop hunting activities in protected areas.	Relationship with the communities
Palmas del Ixcán workers Mill	The consulting team develops the approach with a group of 20 workers of the company Palmas del Ixcán, where 4 questions are posed related to the positive and negative aspects of the company, and the positive and negative aspects of the surrounding communities. The results of the questions are explained below:	Relationship with the communities
		Roads maintenance
	- Lack of knowledge of palm activities by communities,	Natural Resources variability

Stakeholder	Comments	Social aspect
	- Generation of employment for the nearby population and welfare for workers	Support for the community
	- Lack of support for communities in health issues.	Employment creation
	- Good access roads, however, there is a risk of accidents due to high-speed vehicle traffic and excess load.	Accident Prevention
	- Support with formation and recreation to communities. - Bad odors and pest presence	Plagues and disease presence
	- Possible conflicts with the communities due to the lack of agreements. - Risk due to water sources contamination.	Local Economic Growth
	- Movement of local commercial businesses, - Contribution to the maintenance of roads by the company - Training for future workers and equality in dealing with workers is required	Employment training
National Institute of Forests	The dialogue established with the regional director of the INAB, was exposed to the first extent that the Agricultural Phase II project corresponds to the jurisdiction of Fray Bartolomé, therefore, the activities aimed to forest protection undertaken by the company must have the support of that jurisdiction.	Employment creation
	Regarding the sowing of palm oil, he said that this crop has two tendencies: the first generation of	Local Economic Growth
	employment and income for the communities and the second with respect to its internal activity where it is	Land usage change
	evident that it is a monoculture that hinders the interconnection of biological corridors, as well as the possible contamination of water sources by the agrochemicals and shedding that are made. In addition, he says that the communities are quite conflictive and have problems around access to firewood and public services, which has led to an inadequate resources usage, especially land. Finally, he says that within the lines of action there are training and extension projects, incentive projects for companies that generate ecosystem connectivity and nurseries for reforestation.	Natural Resources variability
Tezulutlán community	The approach with the COCODE members of Tezulutlan was carried out as an information mechanism for the Agricultural Phase II project, because the community is removed from the MU and the impacts can occur indirectly. However, the community generates two suggestions for the company Palmas de Ixcán. - That the company maintains communication with COCODE members with the aim of establishing good relations and avoiding conflicts.	Community Support
	- That is supported by the reforestation of a stream near the community, which is important because it provides water supply for carrying out domestic and agricultural activities.	Relationship with the communities

3.1.2   Impacts description

Based on the findings which resulted from the consultation process, the social aspects identified and the analysis of the activities proposed for The Agricultural Phase II implementation, identification of the possible impacts in conjunction with evaluation criteria and the social aspects is generated.

It is necessary to mention that each of the impacts are framed according to the social structure, therefore, the social, economic and cultural aspects of the territory are understood. Therefore, these impacts must be understood as a projection and not as a constant throughout the development of the project, which makes it necessary for the company to have the respective update of the study, with the purpose of integrate new elements of social dynamics. *Table 18* presents a brief description of the impacts to be evaluated and the social impacts that compose it.

Table 18. Description of Socio-Economic Impacts.

Impact	Impact description	Evaluation criteria	Social aspects
Changes in transit and road infrastructure	Heavy vehicles transit on the road is one of the frequent complaints of the communities, since it is one of the development poles of these and includes not only legally constituted roads but traditionally used roads or paths. Some of the affectations are generated due to the excessive weight and use of vehicles with little regulation, which destroys roads, forms hollows, finishes with the little layer of asphalt, removes the material until forming gullies. In addition to this, there are problems such as risk of accidents and damage to private property, given that the transit of vehicles or machinery does not have security measures that prevent this type of situation.	* Vehicles, machinery and equipment Mobilization. *Roads condition *Vehicles condition *Vehicles load capacity	* Communitarian Easements * Vehicular traffic Frequency * Tracks damage or deterioration. * Risk of traffic accidents * Alternating transit routes
Changes in the conditions of life	It refers to a concept that can comprise various levels that can visualize the biological, economic, social and psychological demands individually up to the community level. Not forgetting that this concept is related to aspects of social welfare. Therefore, the concept of quality of life is in constant movement, since it is involved with socio-economic, cultural and psychological aspects, and which generates positive and negative values in individuals. So, we can say that the concept of quality of life and social welfare can have four fields to understand it such as: Physical: where you can have aspects of health and physical safety. Material: have a decent and proper home, with access to all basic services, food within reach and transportation. Educational: existence and proximity to an education where it allows to expand knowledge individually and collectively. Social: where humans beings have interpersonal options with such as family and circles of friends that allow its development. It is important to consider that these mentioned fields can have a different influence on social, medical and political factors and also on individual and community spheres (Galván, María, 2018).	* Use and Protection of Natural Resources. * Hydric Resources Usage *Labor conditions * Local conditions *Type of Work and Infrastructure *Vehicles condition *Machinery use * Vehicles, machinery and equipment mobilization. * Amendments or edaphic fertilization Application	*Natural Resources Quality * Social Issues (Alcohol consumption, drugs, rape, common delinquency) * Plagues and disease presence * Support for better life conditions.
Changes in the local economy	Local economic development can be defined as a process of growth and structural changes that, by using the development potential existing in the territory, leads to the improvement of the well-being of the population of a locality or a region (Vásquez Barquero: 2000). Therefore, local economies obtain different benefits from the activity of local companies and these in turn can obtain competitive advantages through the use of a local approach in the service and marketing activities. The main benefits of businesses in the local economy include an increase in employment and discretionary income in the community, tax revenues for local governments and a customer base loyal to businesses. Local employment One of the most personal advantages of	* Use of machinery *Labor conditions * Locative conditions * Type of work or infrastructure	* Economic income * Local Commerce * Access to employment (Labor inclusion)

Impact	Impact description	Evaluation criteria	Social aspects
	companies in the local economy is the increase in employment within the region. Employment levels influence a range of other standard-of-living measures, such as income, foreclosure rates and new small business ventures. Income tax local. Companies pay a significant part of all taxes in local governments, including income tax, property tax and employment tax. Having more companies, the local economy can increase tax revenues for local governments, so there will be more money to repair roads, enlarge schools and improve public services. Access to services. Along with the level of living standards inherent in supporting local employment, the presence of many types of businesses can raise the standard of living even more by providing a wider range of services and amenities in the local area. Political advantages Companies with strong ties to the local community can lend a hand in community-centered policy actions. Companies can help fund and organize advocacy campaigns, letters and other political activities to influence legislators on issues that affect the local community.		
Conflict in community relations	The concept of conflict opens up great possibilities for study, analysis and diagnosis due to its relationship with human needs, perceptions, emotions, desires, etc. In this sense, the conflict can be understood as a regeneration of the human societies (Morín, 2005), which leads to the fact that the conflict is not only a factor of distortion, but also includes the germ of peace. Therefore, the conflict has both the crisis aspect and the opportunity for change, both the idea of confrontation and the improvement of situations and relationships, which turns conflicts into processes that can lead to different results depending on their development and the methodology used to manage them. This concept fits directly between the link between communities and companies, since there are conflicts of interest and power in the territory, where in turn three relational levels are established with the interested parties: communication, dialogue and participation.	* Mobilization of vehicles, machinery and equipment. * Employee working conditions * Type of work or infrastructure * Use of natural resources. * Protection of natural resources * Application of amendments or edaphic fertilization	* Ease of communication with the company (Communication mechanisms) *Community participation * CM Agreement enforcement * Legality of land

3.1.3 Results of socioeconomic evaluation

Socioeconomic and environmental Impact assessment was made by using the findings found in the process of consultation with the interested parties. For the evaluation, a matrix was designed that contains the definition of the impacts with their respective assessment scale, the identification of impacts for the socioeconomic environment and the rating of impacts for each of the social aspects. The synthesis of the results that this evaluation showed is presented below:

IMPACT	SOCIAL ASPECT	CLASS (C)	PRESENCE (P)	DURATION (D)	EVOLUTION (E)	MAGNITUDE (M)	Weighting constant (a)	Weighting constant (b)	POSITIVE SOCIAL GRADING	NEGATIVE SOCIAL GRADING	WEIGHTED RATE OF IMPACT BY CLASS
Changes in traffic and road infrastructure	Community easements	-	0,5	1,0	0,9	0,8	7,0	3,0	0,0	-5,5	-6,5
	Frequency of vehicular traffic	-	1,0	0,9	1,0	1,0	7,0	3,0	0,0	-9,7	
	Damage or deterioration in the tracks	-	0,9	0,8	0,6	0,8	7,0	3,0	0,0	-5,4	
	Risk of traffic accidents	-	0,8	1,0	0,8	0,8	7,0	3,0	0,0	-6,6	
	Alternate transit routes	-	0,5	1,0	0,9	0,8	7,0	3,0	0,0	-5,5	
Changes in living conditions	Quality of natural resources	-	0,9	0,9	1,0	1,0	7,0	3,0	0,0	-9,0	-4,0
	Social problems (consumption of alcohol, drugs, rape, common crime)	-	0,6	0,9	0,6	0,8	7,0	3,0	0,0	-4,7	
	Presence of pests and diseases	-	0,9	0,8	0,8	0,8	7,0	3,0	0,0	-6,4	
	Support for the improvement of living conditions	+	0,8	0,8	0,4	0,8	7,0	3,0	4,2	0,0	
Changes in the local economy	Economic income	+	0,9	1,0	0,9	0,6	7,0	3,0	6,4	0,0	5,5
	Local Trade	+	0,6	0,8	0,3	0,4	7,0	3,0	2,9	0,0	
	Access to employment (Labor inclusion)	+	1,0	1,0	1,0	0,6	7,0	3,0	7,2	0,0	
Conflict in community relations	Ease of communication with the company (Communication mechanisms)	-	0,6	1,0	0,8	0,8	7,0	3,0	0,0	-5,7	-1,4
	Community participation	+	0,4	0,4	0,7	0,8	7,0	3,0	2,8	0,0	
	Compliance with agreements	-	0,8	1,0	0,8	0,8	7,0	3,0	0,0	-6,6	
	Legality of land	+	0,9	1,0	0,4	0,4	7,0	3,0	4,0	0,0	

Figure 12. Impact evaluation matrix - Arboleda Methodology

- *Trafic and road infraestructure changes*

TRAFFIC AND ROAD INFRASTRUCTURE CHANGES			
STAKEHOLDER	**SOCIAL ASPECT**	**POSITIVE IMPORTANCE**	**NEGATIVE IMPORTANCE**
Neighbors of the MU Yalmachac community Mucbilha II community San Francisco de las Mercedes community Chisec municipality	Community easements	NONE	AVERAGE
	Frequency of vehicular traffic	NONE	VERY HIGH
	Damage or deterioration in the tracks	NONE	AVERAGE
	Risk of traffic accidents	NONE	HIGH
	Alternate transit routes	NONE	AVERAGE
ANALYSIS OF RESULTS AND AFFECTION OF THE ENVIRONMENT			

The Agricultural Phase II project development is conditioned by the use of vehicles with heavy loads and machinery for their proper functioning, either by the transportation of personnel, consumables, production of fruit and their derivatives. These conditions generate a greater use of roads in the territory which, in turn, reduce the risk of accidents due to the lack of signaling, traffic at high speeds, excess load (falling fruit), vehicle conditions .   .

Therefore, it is identified that the frequency of vehicular traffic is one of the critical aspects in the implementation of the project, since it not only develops within the MU but also transcends the surrounding communities. This factor is decisive in the change of the socio-cultural dynamics of the population, especially for the Mucbilha II community, since it causes effects around the presence of particulate material, damages to third parties and discomfort in the population.

At the same time, the risk of traffic accidents is identified as an impact factor, since, beyond excessive use of
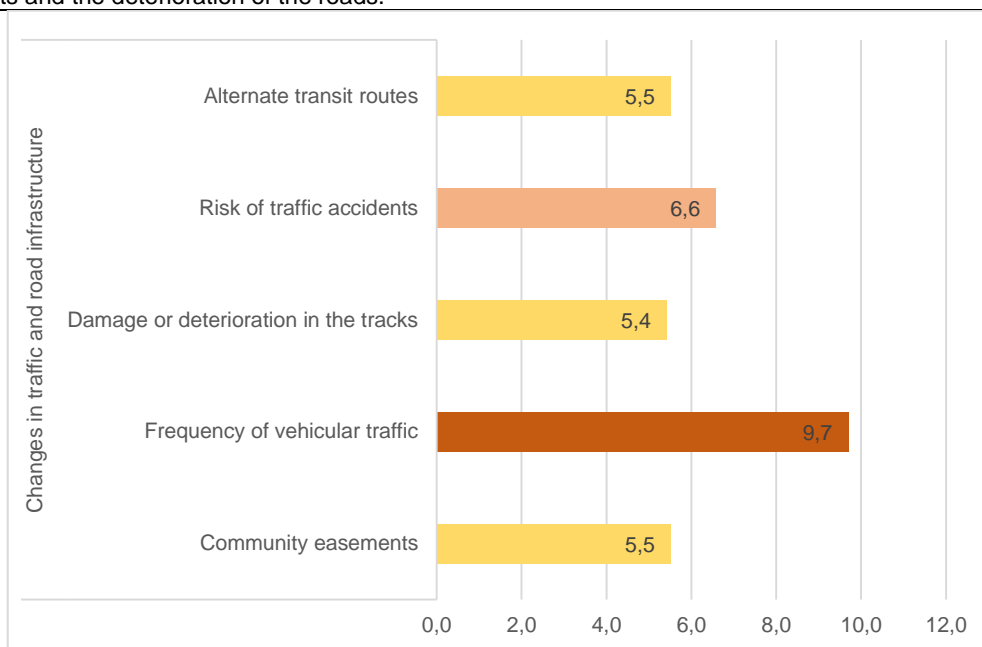
means, incidents may occur due to the transit of machinery, vehicles with excessive speed and lack of signaling in the area, where the communities are located (social infrastructure). In addition, the presence of this social aspect is determined by the compliance or not of standards or laws established for traffic control, which, if there is no monitoring and control of the movement of machinery, equipment and vehicles can cause conflicts with the habitants.

Regarding the aspect of damage or deterioration of the roads, is conditioned by the frequency of use of the roads and maintenance actions that the company generates in these, taking into account the contributions made so far by Palmas del Ixcán, it is not considered a critical element in the implementation of the project. However, this social aspect may change during the implementation of project activities.

Regarding the remaining social aspects are isolated factors, which are subject to agreements isolated from the activities of palm cultivation, so that their presence or effect can change according to the organizational dynamics of the communities.

As for the activities that can increase this impact, the following are considered:
- Sowing and establishment of the crop. Due to the need to use machinery and equipment in the construction of channels and internal access roads.
- Harvest. Given the exigencies of transit of internal and external fruit, it increases the vehicular flow, the possibility of accidents and the deterioration of the roads.

- *Changes in life conditions*

CHANGES IN LIFE CONDITIONS.			
STAKEHOLDER	**SOCIAL ASPECT**	**POSITIVE IMPORTANCE**	**NEGATIVE IMPORTANCE**
Mucbilha II community Yalmachac community Serranía de la Bendición community Samaria community San Francisco de las	Natural Resources Quality	NONE	VERY HIGH
	Social issues (alcohol consumption, illegal substances, sexual abuse, common delinquency)	NONE	AVERAGE

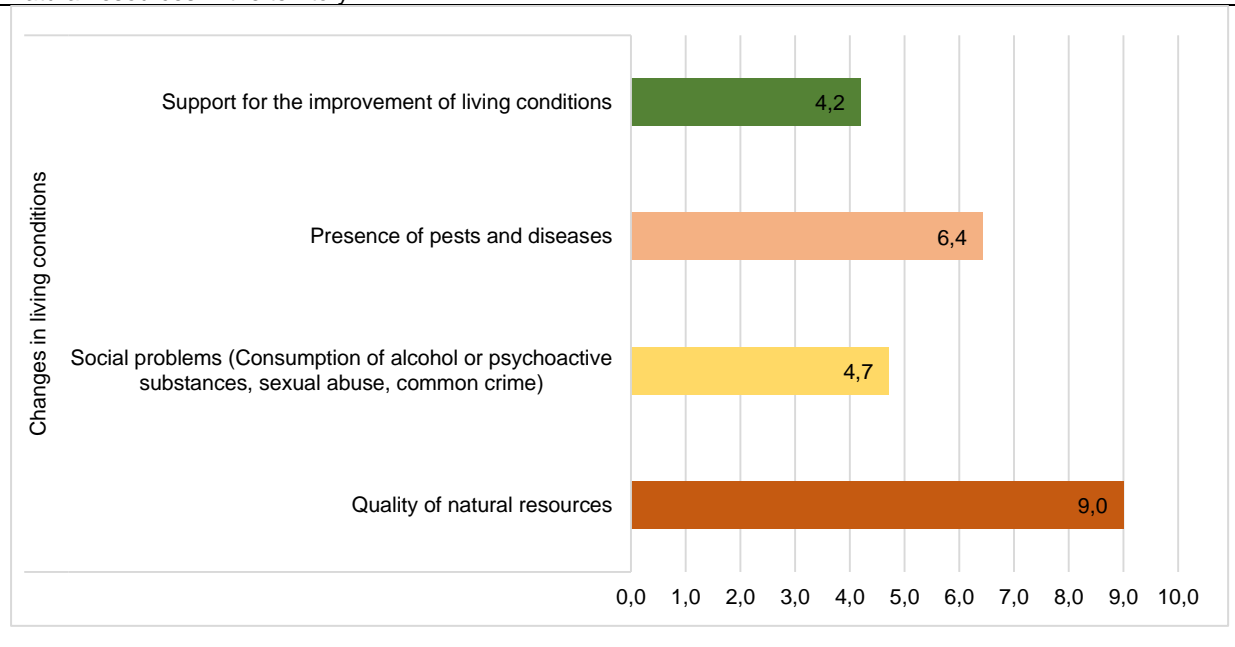| Mercedes community Las Mercedes I. Chisec Municipality (Health district) Environment and Natural Resources Ministry	Plagues and disease presence	NONE	HIGH
	Support for better life conditions.	AVERAGE	NONE

ANALYSIS OF RESULTS AND AFFECTION OF THE ENVIRONMENT

Living conditions are directly related to the population's feelings, the use of natural resources and their housing and community conditions. Although the development of the Agricultural Phase II project has a property and the establishment of the crop does not involve immigration or establishment of new communities. It is possible that it will generate changes in the current living conditions in which the neighboring villages are developed.

For this reason, the management that is given to the interior of the crop can cause positive or negative changes in the territory´s conditions, which shows changes in the current natural resources state, the landscape and economic activities. If the changes generated are negative, it can cause dissatisfaction and dissatisfaction on the part of some residents, which in turn is conducive to the presence of conflicts.

In the first place, it is identified that the development of the Agricultural Phase II project compromises the conditions of the community use resources, due to the transformation that this demands; However, the activities that can increase or potentiate the impact if they do not develop properly are fertilization, maintenance of weeds, pests and diseases, and application of composting, since there is the use of chemical and organic agents that can be put in place, it risks the quality of air and nearby tributaries, as well as the health of the inhabitants to each plantation. In addition, the application of composting can be a focus of pests such as flies or butterflies that puts at risk the socio-economic dynamics of its inhabitants. For the specific case of the Mercedes property unit, it is identified that it is located in the limits of the San Francisco de las Mercedes village and has water sources for community use in its interior, which determines a greater probability that the impact will be generated.

Regarding the presence of social problems does not necessarily correspond to the implementation of new palm oil plantings, but it is not excluded that there is a greater probability of increase due to the presence of the crop. Even so, it is noted that the presence of the company Palmas del Ixcán has been a key player in programs or projects under the scheme of corporate social responsibility that can improve the living conditions of communities beyond earning income from work made, as long as these projects are within the reach of the company. Finally, this impact must be understood from the holistic and systemic perspective, so it is understood that the environmental conditions directly related to social management and similarly, human development is determined by the quality of natural resources in the territory.

- *Changes in the local economy*

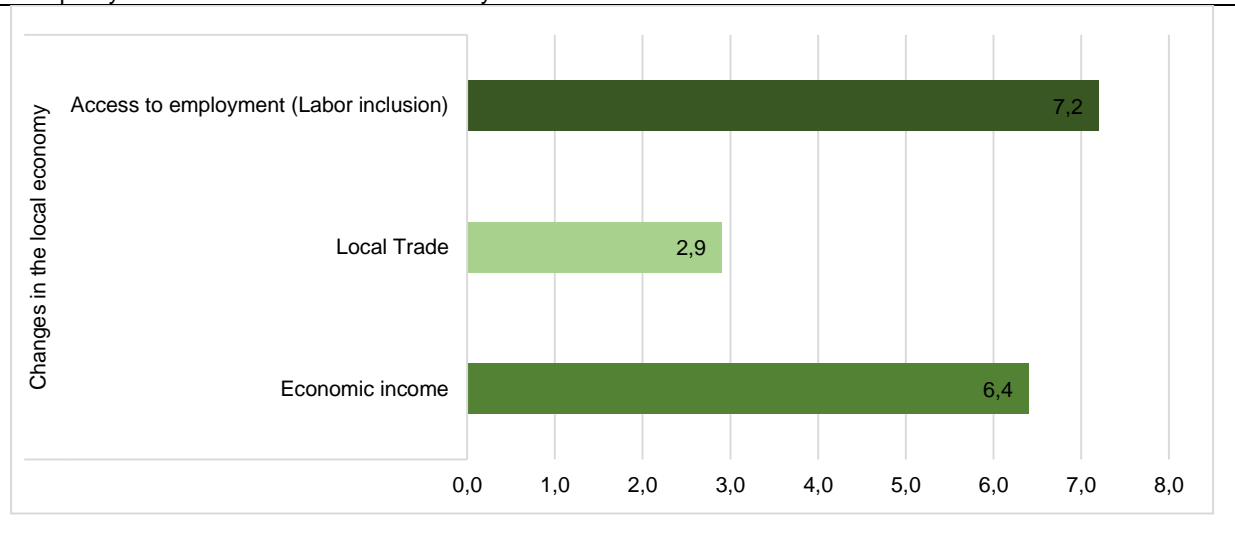| CHANGES IN THE LOCAL ECONOMY			
STAKEHOLDER	SOCIAL ASPECT	POSITIVE IMPORTANCE	NEGATIVE IMPORTANCE
Mucbilha II community Yalmachac community Samaria community San Francisco de las Mercedes community Chisec municipality	Economic income	HIGH	NONE
	Local Trade	LOW	NONE
	Access to employment (Labor inclusion)	HIGH	NONE
ANALYSIS OF RESULTS AND AFFECTION OF THE ENVIRONMENT			

The palm tree activity, characterized by its permanence in the territory, the significant number of contracted labor and the diversity of stages it has, makes it easier for production factors in correlation with the social fabric to provide guarantees of economic growth in the area. This is how the implementation of the Agricultural Phase II project, encourages communities to have an alternative employment that ensures constant income not only for their workers but for small businesses that revolve around it, such as trade, and provision of services.

First of all, the aspects evaluated to determine the degree of affectation in the local economy, it is identified that the generation of employment in the project although it is a positive aspect for the communities, in turn is subject to the contracting capacity of the project. company and the conditions or stages of palm oil cultivation.

Secondly, access to economic income, it is a significant point for the activation of the local economy, since with greater purchasing power greater ease of developing business alternatives and this in turn, translates into the satisfaction of basic needs and decrease in poverty.

In addition, each of these aspects are considered to be rapidly evolving in the territory and with a long-term permanence, but with a magnitude of medium impact given the contracting capacity for the development of new palm oil plantations. As third aspect could be found that the presence of social problems does not necessarily correspond to the implementation of new palm oil plantings, but it is not excluded that there is a greater probability of increase due to the presence of the crop. Even so, it is noted that the presence of the company Palmas del Ixcán has been a key player in programs or projects under the scheme of corporate social responsibility that can improve the living conditions of communities beyond earning income from work. made, as long as these projects are within the reach of the company.

Finally, this impact must be understood from the holistic and systemic perspective, so it is understood that the environmental conditions directly related to social management and similarly, human development is determined by the quality of natural resources in the territory.

- *Conflict in community relations*

CONFLICT IN COMMUNITY RELATIONS			
STAKEHOLDER	**SOCIAL ASPECT**	**POSITIVE IMPORTANCE**	**NEGATIVE IMPORTANCE**
Mucbilha II community Yalmachac community Serranía de la Bendición community Samaria community San Francisco de las Mercedes community Las Mercedes I community Chisec municipality Secretaria de Asuntos Agrícolas Ministerio de Ambiente y Recursos Naturales	Ease of communication with the company (Communication mechanisms)	NONE	AVERAGE
	Community participation	LOW	NONE
	Compliance with agreements	NONE	HIGH
	Legality of land	AVERAGE	NONE
ANALYSIS OF RESULTS AND AFFECTION OF THE ENVIRONMENT			

Implementation of new projects in the territory, brings expectations and conflict between the company and the communities. For this reason, the establishment of communication channels, the fulfillment of agreements and participation, are relevant factors for the development of relationships based on trust. In turn, the degree of rapprochement, communication and community involvement projects generate the corporate image in front of the population, which can be very positive or very negative.

In the evaluation, the two contexts are presented; the first one related to the legality of the land and the willingness to participate in community spaces by the company, which is for this case have a positive assessment in front of the communities. This is evidenced in the approval of the establishment of new palm oil plantations through community records and the inhabitants' own perception of land tenure by a private sector.

The second context includes negative evaluations, due to the limited presence that Palmas del Ixcán has in the area of influence. There, weak communication channels are identified and the possibility of conflict due to the involvement of agreements of any of the parties.
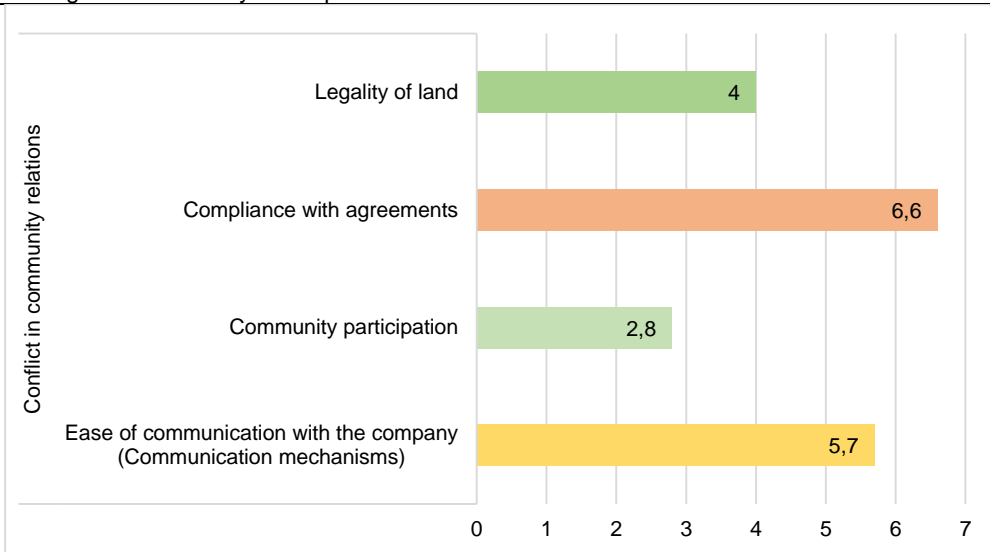
3.2   Environmental Impact Assessment (EIA)

Table 19 shows the results of the environmental impact assessment for the physical and biological components.

Table 19. Results evaluation of environmental impacts.

Matrix of identification and weighting of environmental impacts													
Identification and description of impacts			Assessment of impacts										
Environmental Components			Environmental impacts	Existence (Present / Absent)	Immediateness (Direct/ Indirect)	Nature (+)(-)	Intensity (IN)	Reversibility (RV)	Extension (EX)	Effect	Value of importance		Evaluation
Environmental factors	Physics	Air	Generation of particulate material	P	I	(-)	1	1	1	1	(-)	7	(-)	LOW
			Smoke generation	P	D	(-)	2	2	1	4	(-)	15	(-)	AVERAGE
			Generation of Odors	A										
			Noise generation	P	D	(-)	2	2	1	4	(-)	15	(-)	AVERAGE
		Ground	Instability of the soil	A										
			Ground movement	P	D	(-)	2	2	1	4	(-)	15	(-)	AVERAGE
			Soil erosion	P	D	(-)	2	2	1	4	(-)	15	(-)	AVERAGE
			Generation of common solid waste	P	D	(-)	2	2	1	4	(-)	15	(-)	AVERAGE
			Generation of special solid waste	A										
		Water	Instability of the flow of drinking water for the local area	A										
			Water quality	A										
			Final disposition of residual water	P	D	(+)	4		1	4	(+)	17	(+)	AVERAGE
			Surface water	A										
			Groundwater	A										
			Susceptibility to floods	A										
	Biological	Flora	Vegetable Cover	A										
			Interference	P	D	(-)	2	2	1	4	(-)	15	(-)	AVERAGE

Matrix of identification and weighting of environmental impacts												
Identification and description of impacts			Assessment of impacts									
Environmental Components			Environmental impacts	Existence (Present / Absent)	Immediateness (Direct/ Indirect)	Nature (+)(-)	Intensity (IN)	Reversibility (RV)	Extension (EX)	Effect	Value of importance	Evaluation
			and disturbances to flora									
			Forest fires	A								
			Endangered species	A								
		Wildlife	Terrestrial and aerial fauna	A								
			Aquatic fauna	A								
			Interference and disturbance to fauna	A								
			Endangered species	A								

- *Air:* For the establishment and operation phase, there are no activities that directly affect air quality. The only related activity in these stages that causes indirect impact to air quality is the production of carbon monoxide, as a consequence of the transportation that the inhabitants use in the vicinity of the project. The negative impacts mainly on-air quality due to the generation of dust and particles in suspension could occur in the harvest and transport of the final product, but the magnitude of the impact is minimal. In the stage of preparation of the roads and sowing stage, the generation of dust and particles in suspension will be present, but not perceptible, since the location of the project means that the soil is found almost every month of the year with enough water. It will not let the impact of dust become a significant problem. The circulation of vehicles also generates noise, however, as mentioned in the previous paragraph it is considered that the project will not generate a change in the number of vehicles circulating in the place.

- *Ground:* The project: PLACAS DEL IXCÁN, during operation will generate wastes and common garbage. To avoid the bad disposition of the common waste, a temporary stockpile will be established in the work area to later send the waste that can be recycled to its collection in the recycling area and then make the final disposal. In the same way, the few organic wastes that could be generated will be sent to a vermicompost which will give the final disposal, both the recycling area and the worm compost will be located outside the project area: PALMAS DEL IXCÁN. It is It is important to mention that as it is an agricultural project, there is production of waste from the packaging of pesticides and herbicides, which will be stored in a temporary collection, for its subsequent final disposal according to the guidelines applicable to these materials and following the procedures established in the recycling area.

- *Water:* The project must install biological beds or biodep for the treatment of liquid waste coming from the washing of the fumigation containers, of NOT installing any biological bed or biodep, it must use the ones that the project has: PALMAS DEL IXCÁN, in their different farms. With respect to rainwater, as it is an agricultural project, they infiltrate the ground, taking advantage of them as irrigation, since no irrigation system is required at any time of year in the plantation

3.3   High Conservation Values (HCV)

The present study identifies areas with conservation values in the evaluated Management Units and their surrounding areas, whose results facilitate the decision making related to the new palm oil developments. The evaluation process was carried out in three phases; during the phase of scoping or preliminary approach the approach was made with representatives of some interested parties in order to verify geographic information of the project and to know the concerns or recommendations of the same ones. The characterization of the wider landscape context yielded the following results:

3.3.1   Scope of HCV assessment

Palmas del Ixcán proposes two (2) Management Units (MU) for new developments of oil palm, both localized at the north of the Guatemala Republic in the Alta Verapaz department, Chisec municipality (*Figure 13*). Together, both MU cover 559,96 ha.
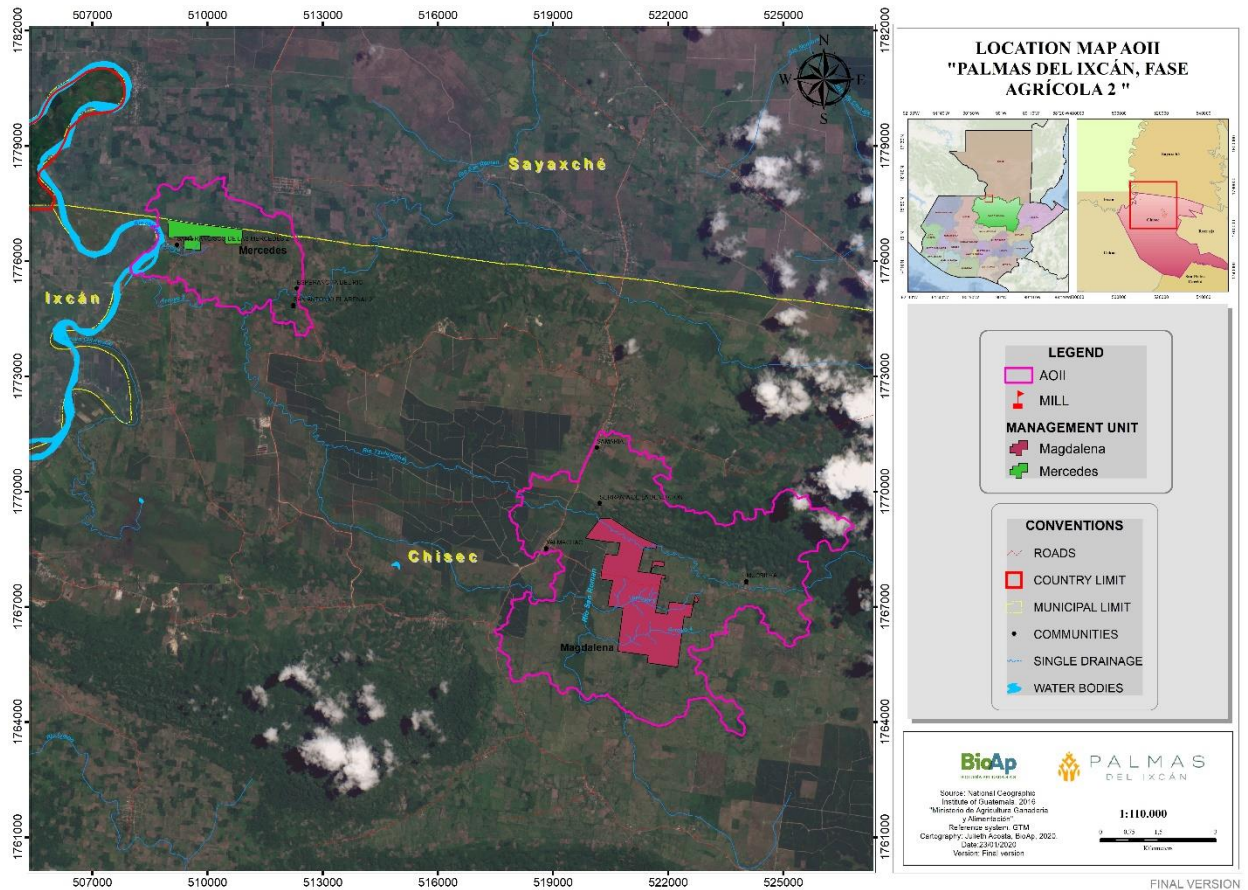
Figure 13. Location map, Magdalena and Mercedes MU, and AOII.

3.3.2   Proposed dates for the development of new plantings

Palmas del Ixcán is planning to start land clearance and adaptation in the first half of 2021, once the New Planting Procedure has been approved by RSPO.

3.3.3   National and Regional Context

The Areas of Indirect Influence belonging to the Management Units under study are located in the departments of Alta Verapaz, Petén and Quiché. According to the distribution of the ethnolinguistic communities, the Q'eqchi 'population is concentrated in the department of Alta Verapaz, in the municipalities of Chisec and Sayaxché (Petén) and in the communities present in the AOII. Is also restricted linguistically to the north with the community linguistics Itza '; to the south, with the Poqomchi 'community; to the east, with the Garífuna community; and to the west, with the linguistic regions K'iche ', Uspanteko, Ixil and the multilingual zone of Ixcán, Playa Grande, Quiché (Grünberg, G., 2003).

According to the ecoregions defined by the World Wide Fund for Nature (WWF), it was identified that the AOII under study are beneath the eco-region called Petén - Veracruz moist Forest, and in Guatemala. This ecoregion corresponds to the largest coverage, with an extension of 47.876 km^2 that is equivalent to 44,1% of the national territory, and represents the 53,3% of Guatemalan System of Protected Areas (BANGUAT, URL, & IARNA, 2009).

The AOII are located within the Mesoamerica biodiversity hotspot, which is ranked as the second most important in the world in terms of diversity and endemism (Critical Ecosystem Partnership Fund , 2004). In terms of species diversity, this hotspot is the second with the highest endemism for amphibians, birds,

reptiles, and mammals, finding between 7 % and 10 % of all forms of life that are currently known. Regarding the flora, it is the area with the greatest richness of orchids in the world, containing about 10 % of the known species, which corresponds to approximately 2.670 species (Bogarín, Pupulin, Arrocha, & Warner, 2013).

3.3.4   Landscape context

Table 20 shows the main land cover and land uses of both the Management Units and each of the AOII. *Figure 14 and Figure 15* present the maps of land cover and uses of the AOII and MU.

Table 20. Land covers and land use in MU and AOII.

| MU	Land covers and land use in the AOII	Land covers and use in the MU
MAGDALENA	The land cover of the AOII is a mosaic of natural covers and transformed areas, where most of the surface is dominated by clean pastures (54,86 %). This land cover is followed by dense forest cover, which occupies 24,04 % of the AOII. Some other coverages that predominate in the area correspond to oil palm monoculture (10,12 %), secondary forest (2,52 %), shrubs (2,31 %), fragmented forest (1,63 %), urban areas (1,61 %) and gallery and riparian forest (1,09 %). The other land covers have an occupation of less than 1 % of the total area evaluated. The most representative land uses in the AOII correspond to agricultural-livestock (65,69 %), natural forests (26,76 %), semi-natural areas (3,14 %) and artificialized territories (1,66 %)	Magdalena MU land cover is dominated by clean pastures that occupy 91,60 % of the surface, followed by shrubs (5,13 %) and gallery and riparian forest (2,71 %). The other land covers, have an extension of less than 1 % and correspond to build-up areas (0,34 %) and water bodies (0,22 %). The land uses of the MU correspond to agriculture and livestock (91,60 % of the surface), semi-natural areas (5,13 %), natural forests (2,71 %), build-up areas (0,34 %) and water bodies (0,22 %).
MERCEDES	The AOII is represented by a mosaic of natural covers and transformed areas, with transitory crops predominating in 32,43 % of the area's surface. This cover is followed in representativeness by clean and cultivated pastures (31,77 %), oil palm (8,14 %), dense forest (7,69 %), fragmented forest (5,74 %), secondary forest (3,35 %), shrubs (3,01 %), urban areas (2,51 %), water bodies (2,37 %), pastures with shrubs (1,56 %) and grassland (1,23 %). The other coverages present (riparian forest, clean areas and swamp) are less than 1 % of the total of the AOII. The main land uses associated with these covers in the AOII correspond to agricultural-livestock use (73,91 %), natural forests (16,96 %), semi-natural areas (4,24 %), artificialized territories (2,51 %), water bodies (2,37 %) and natural floodable areas (0,01 %).	In the Mercedes MU, the predominant land cover corresponds to weed grasses (47,35 %), dense forest (33,02 %), clean pastures (12,80 %) and shrubs (6,83 %). The land uses of the MU, in order of dominance, correspond to agricultural-livestock (60,15 %), natural forests (33,02 %) and semi-natural areas (6,83 %).
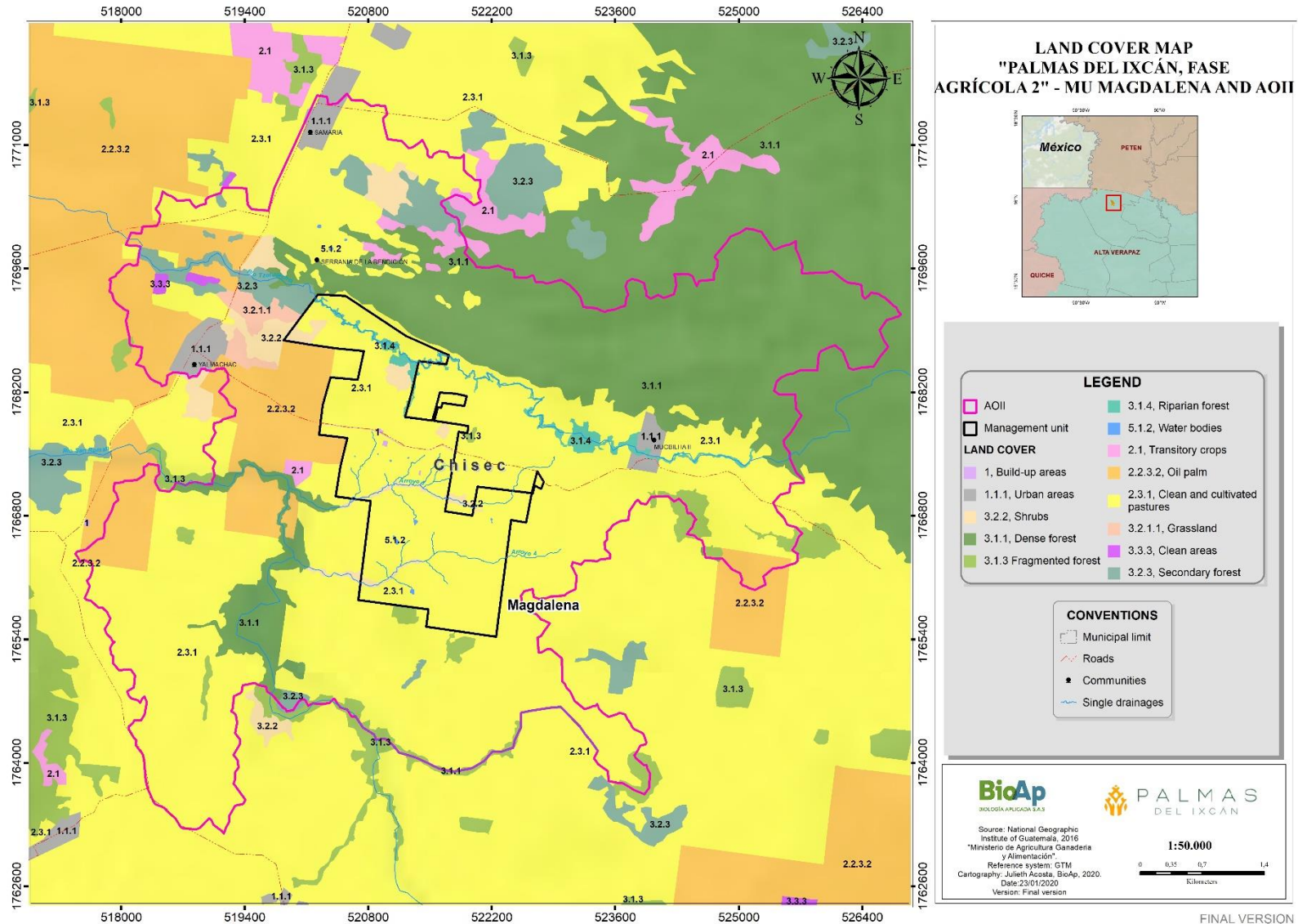
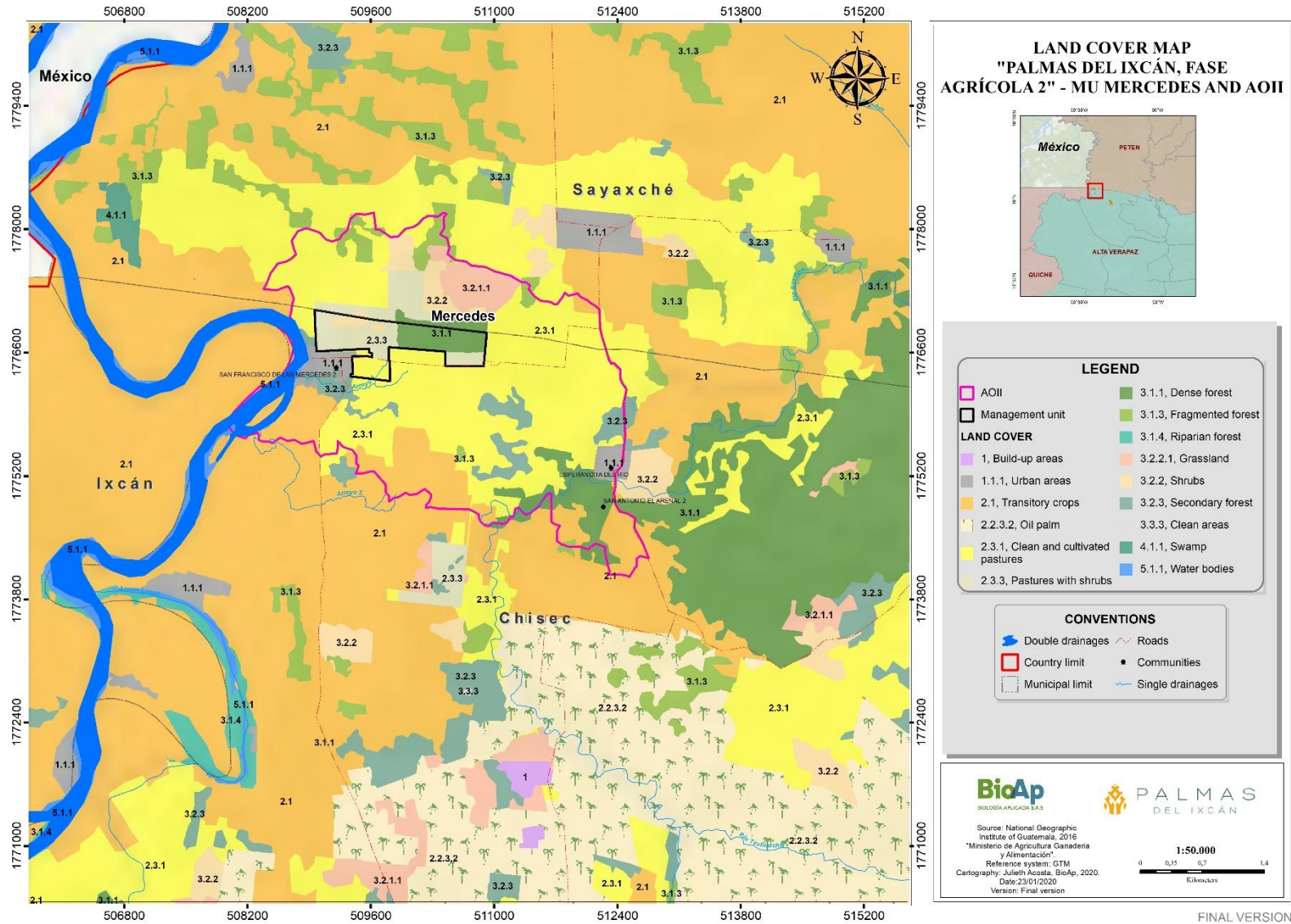*Figure 14. Land cover map, Magdalena MU and its AOII.*

Figure 15. Land cover map, Mercedes MU and its AOII.

It was identified that the Area of Indirect Influence of the Magdalena MU overlaps with the special protection area "Sierra de Chinajá", located north of the department of Alta Verapaz, as evidenced in the *Figure 16.* This was declared as a Special Protection Area by the National Council of Protected Areas (CONAP) in 1989 (CONAP, 2016). According to the definition given by national legislation to said category, it is stipulated that the Special Protection Areas require additional and specific technical studies so that it can be permanently recognized under the protected area classification. Consequently, this area currently lacks formal management and administration by the State. (Bonham, y otros, 2009). Likewise, it has been threatened by the advance of the agricultural and livestock frontier, the hunting and illegal wood exploitation, oil exploration, and land invasion, so that its forest cover is rather a mosaic of plant succession with small fragments of forests in the areas of least accessibility. In contrast, the AOII of Mercedes MU presents no overlapping with any protected area.
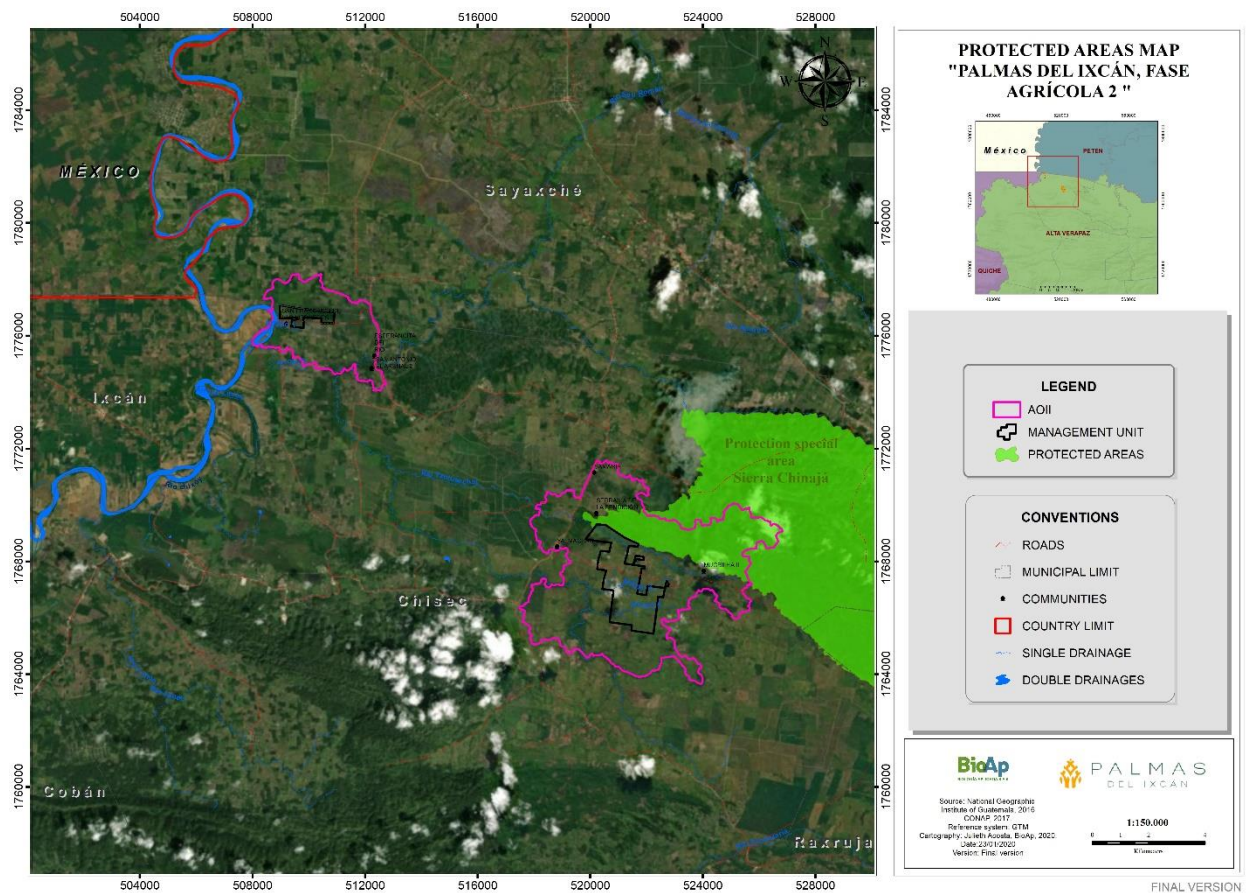
Figure 16. Map of protected areas.

Likewise, the AOII of the Magdalena MU is located approximately 23 km from the Laguna Lachua Ramsar area. Which was declared in 1996 as a national protected area and recognized in 2006 as an area of international importance and interest for conservation (Universidad Rafael Landívar Vista Hermosa, 2017) (*Figure 17*). Also, by using the information of the World Database of Key Biodiversity Areas (KBA) (BirdLife International, 2018a) and of the Important Bird and Biodiversity Areas (IBAs) (BirdLife International, 2018b) was found that the AOII of Magdalena MU is within the IBA-KBA Candelaria-Campur and which limits by the southwest extremity with IBA-KBA Lachuá IK bolay. On the other hand, the AOII of Mercedes MU overlaps with the IBA Lachuá Ik'bolay, which is located 5,2 km from IBA-KBA Lachuá IK bolay. Finally, according to the information provided about Intact Forest Landscapes (Potapov, y otros, 2016) it was identified that the closest IFL is located approximately 53 km from the AOII of Mercedes MU.
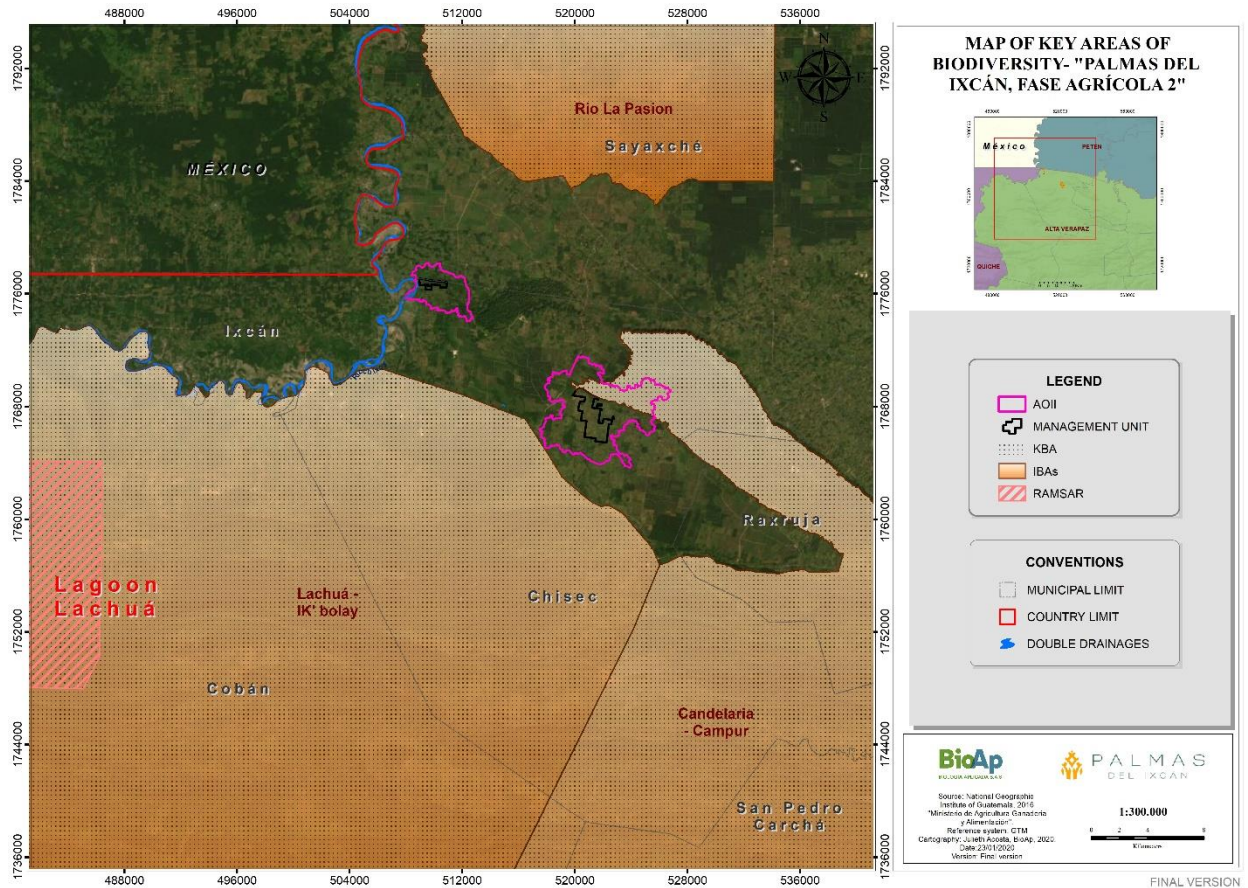
Figure 17. Map of key biodiversity areas.

In the AOII of Magdalena MU, the ecosystem that occupies 65,69 % of the total area corresponds to agricultural systems, followed by evergreen and semi-evergreen broadleaf forests (29,29 %), broadleaf shrubs (2,31 %), and urban ecosystem (1,66%) and in less proportion the savanna ecosystem, the areas with sparse vegetation and wáter bodies. Similarly, in the AOII of the Mercedes MU, the main ecosystem identified corresponds to agricultural systems with 71,12 % occupation, followed by evergreen and semi-evergreen broadleaf forests (16,47 %), savanna (3,86 %), broadleaf shrubs (3,32 %) urban ecosystem (2,81 %) and water bodies (2,43 %). Evergreen and semi-evergreen broadleaf forests are grouped at the national level within the large tropical forest ecosystem (United States Agency for International Development, 2002). These forests include the tropical humid-very humid forest ecosystem and life zone, which supports very complex associations that can contain at least 4.000 plant species and around 450 species of trees. The departments that have the greatest presence of this ecosystem are Petén, Alta Verapaz and Izabal.

In the IIAs of the MUs defined for the development of new sowings, seven migrant Q'eqchi speaking villages from other areas of the country are located, as shown in *Figure 18. Table 21* shows some general characteristics of the socio-economic and cultural conditions of each one of them, which are part of the information collected from fieldwork and the review of secondary sources.

Table 21. Main characteristics of the communities present in the AOII.

Community	Location	Population and ethnicity	Productive activities	Socioeconomic context Infrastructure	Land occupancy	Cultural areas
Samaria	It is located in the micro-region1 of Samaría in the municipality of Chisec, department of Alta Verapaz. Here is the Auxiliary City Hall of Samaría location, which integrates 14 populated centers.	596 inhabitants mainly Ladina population speakers of the Q´echi language. Crops include Oil palm, Cardamom, corn, beans.	Oil palm, Cardamom, corn, beans. Livestock and livestock production of minor species (pigs and birds).	The town center counts with service of water by piped water, and electrical energy. In terms of infrastructure, there is an educational center for basic education, The Headquarters of the Auxiliary Mayor's Office, recreation areas (soccer field) and religious spaces (Catholic and Christian temples). Large parts of the houses are made of wood and laminate.	Agricultural and livestock by Individual and private plots.	Does not registers
Serrania de la Bendicion	Settlement located on the slope of the Sierra Chinajá in the area corresponding to Samaria´s micro region in the municipality of Chisec, Alta Verapaz.	71 inhabitants mainly Ladina population. Q´echi´ is their native language.	Oil palm, Cardamom crops. Minor species livestock production (pigs and birds)	Presents a piped water service, which is pull out from the local Samaria aqueduct, as well as the electric power service. They do not present any social infrastructure. The houses are made of wood and laminate mostly.	Settlement without land ownership in the Sierra Chinajá protected area.	Does not registers
Mucbilha II	Village located at 1.18km from Magdalena MU, in the Samaria micro-region inside the municipality of Chisec, Alta Verapaz.	672[2] inhabitants belonging to the Q´echi´ linguistic community.	Palm oil, corn, beans, cardamom, bananas, sweet potatoes and cassava crops. Minor species livestock production (pigs and birds).	Tzulusechaj river supplies water to the community and natural water sources from the Sierra Chinajá. Energy service and cooking is by firewood. There is presence of an educational center, community hall and infrastructure of a religious nature (Catholic). The residents denote maintenance of internal roads.	Agricultural and livestock by Individual and private plots.	Hix ceremonial site Ceremonial site La Pita (Sierra del Chinajá)
Yalmachac	Community located by the road that connects the urban center of	445 inhabitants mainly Ladino population.Q´ech	Oil palm, Cardamom, corn, beans. Livestock	Likewise Samaria community, there is water which is supplied through pipes (local aqueduct) and	Agricultural and livestock by Individual and	Does not registers

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[1] Micro region: Territorial unit of the municipality organized according to common characteristics that includes access, production and services. Improves the channeling of municipal public services.

[2] This data is obtained from the COCODE Board of Directors through its own records for 2018.

| Community	Location	Population and ethnicity	Productive activities	Socioeconomic context Infrastructure	Land occupancy	Cultural areas
	Chisec with the Auxiliary Mayor's Office of Samaria. Microregion of Samaría Chisec, Alta Verapaz.	i´ is their native language.	and livestock production of minor species (pigs and birds).	electricity. They also have a primary school educational center, a communal room and religious spaces. As for roads, paving of the main road that connects with the City Hall is denoted.	private plots.	
San Francisco de las Mercedes 2	Village located near to the Chixoy River in the Tierra Linda micro-region in the municipality of Chisec, Alta Verapaz.	593 inhabitants belonging to the Q´echi´ linguistic community.	Palm oil, corn, beans and chili crops. Minor species livestock (pigs and birds) for commercialization and family consumption.	The community does not have access to public domiciliary services, therefore, the water supply comes from The Chixoy River and natural sources of water located in Mercedes MU. Firewood is used as source of energy for lighting and cooking. The community presents an unpaved way of entry. As for community infrastructure, there is an educational center, a communal hall and temples of Catholic or Christian origin. They also have a recreational space (soccer field). Regarding the houses, these were built mainly in wood, sheet or straw.	Agricultural and livestock by Individual and private plots. Communal areas	Does not registers
Esperancita Del Río	The village is located in the Samaria microregion, near the San Roman River in the municipality of Chisec, Alta Verapaz.	425 inhabitants mainly population Ladino speakers of the Q´echi´ language.	Corn, beans, pineapple cattle, poultry and pigs, for family consumption and marketing	The Village has access to energy power and water supply form Río San Roman, and intermittent streams. In addition, the community has an educational center, a communal hall and the road that connects with the Samaría Village is unpaved. The use of firewood for cooking and wood for the construction of houses and other buildings is recognized.	Agricultural and livestock by Individual and private plots.	Does not registers
San Antonio Del Arenal II	The village is located in the Samaria micro region, near the San Roman River at the municipality of Chisec, Alta Verapaz.	125 inhabitants mainly Ladino population. Q´echi´ is their native language.	Bean; corn, cardamom, poultry and pigs for family consumption and marketing	Rio San Roman and a source of natural water supply the community form water. Energy services and cooking is produced throughout the usage of firewood. In addition, they have an educational center, community hall and infrastructure of a religious nature (Catholic).	Agricultural and livestock by Individual and private plots.	Does not registers
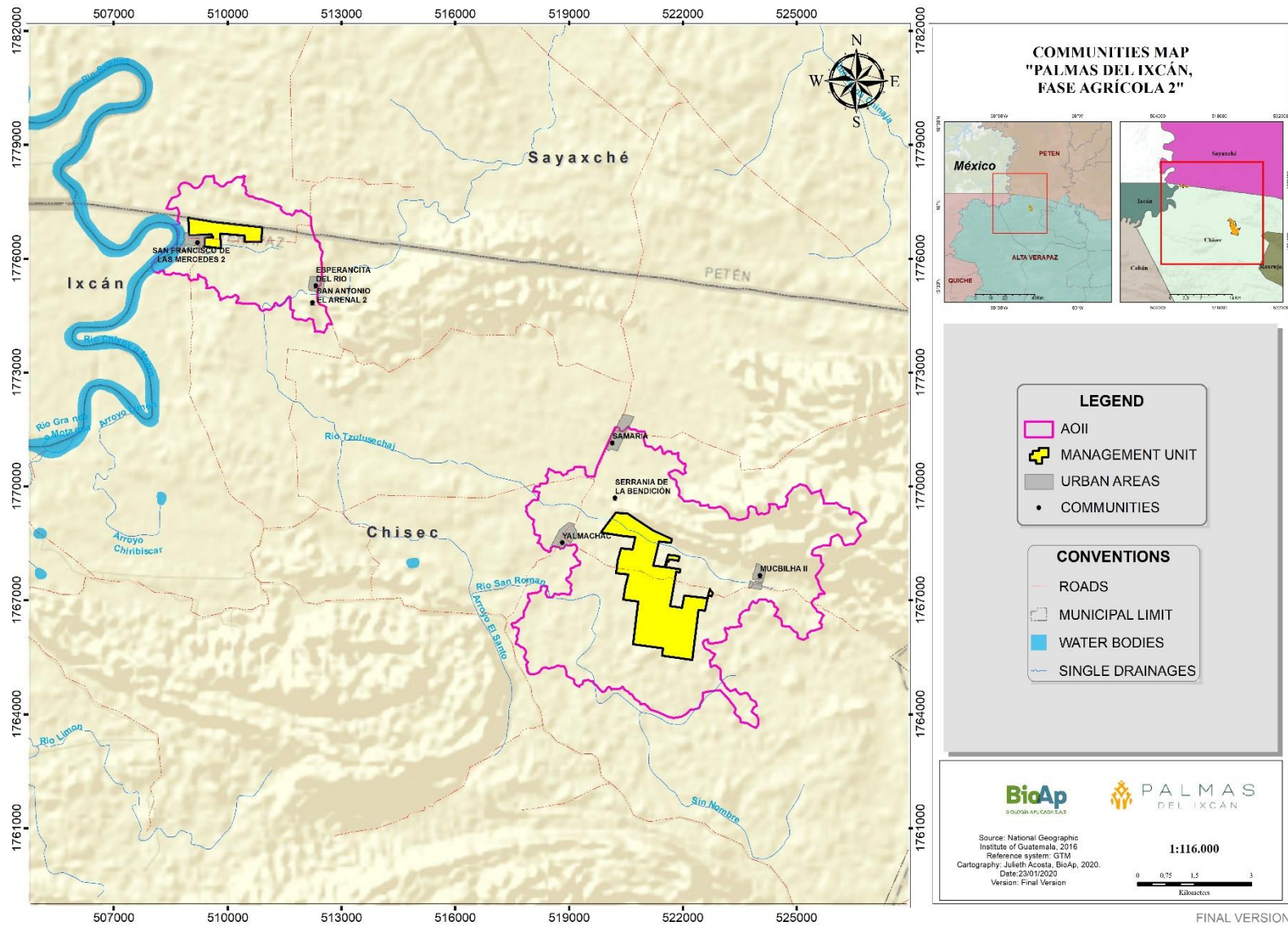
Figure 18. Communities map.

3.3.5 Land use/cover change

The Principles and Criteria (P&C) defined by the RSPO establish that there must be evidence that the new plantations development since November of 2005, has not involved the replacement of primary forests or any area necessary to maintain or improve one or more High Conservation Values. Therefore, to guarantee compliance with these criteria, the land change usage was carried out from 2005 to 2018, in both Management Units. These results are presented in *Figure 19, Figure 20*, and *Table 22*.

Table 22. Change of coverages and land use in MU.

Management Unit	Land Cover	2005 (ha)	2018 (ha)
MAGDALENA	Bushes	41,52	24,55
	Gallery and riparian forest	25,02	12,96
	Lagoon	1,09	1,08
	Clean grasses	409,5	438,63
	Artificialized territories	1,65	1,65
Total MU Magdalena		*478,87*	*478,87*
MERCEDES	Bushes	8,08	5,54
	Dense forest	26,78	26,78
	Weed grasses	35,24	38,40
	Clean grasses	11,00	10,38
Total MU Mercedes		*81,09*	*81,09*

In accordance to *Table 22*, the Magdalena Management Unit during the period between 2005 and 2019 presented a loss of 12,06 ha of gallery and riparian forest cover to give way to clean areas of shrubs and pastures. This situation is very common in this area since livestock and milpa (Mesoamerican agroecosystem whose main productive components are corn, beans and squash) are common deforestation activities and factors in the region.
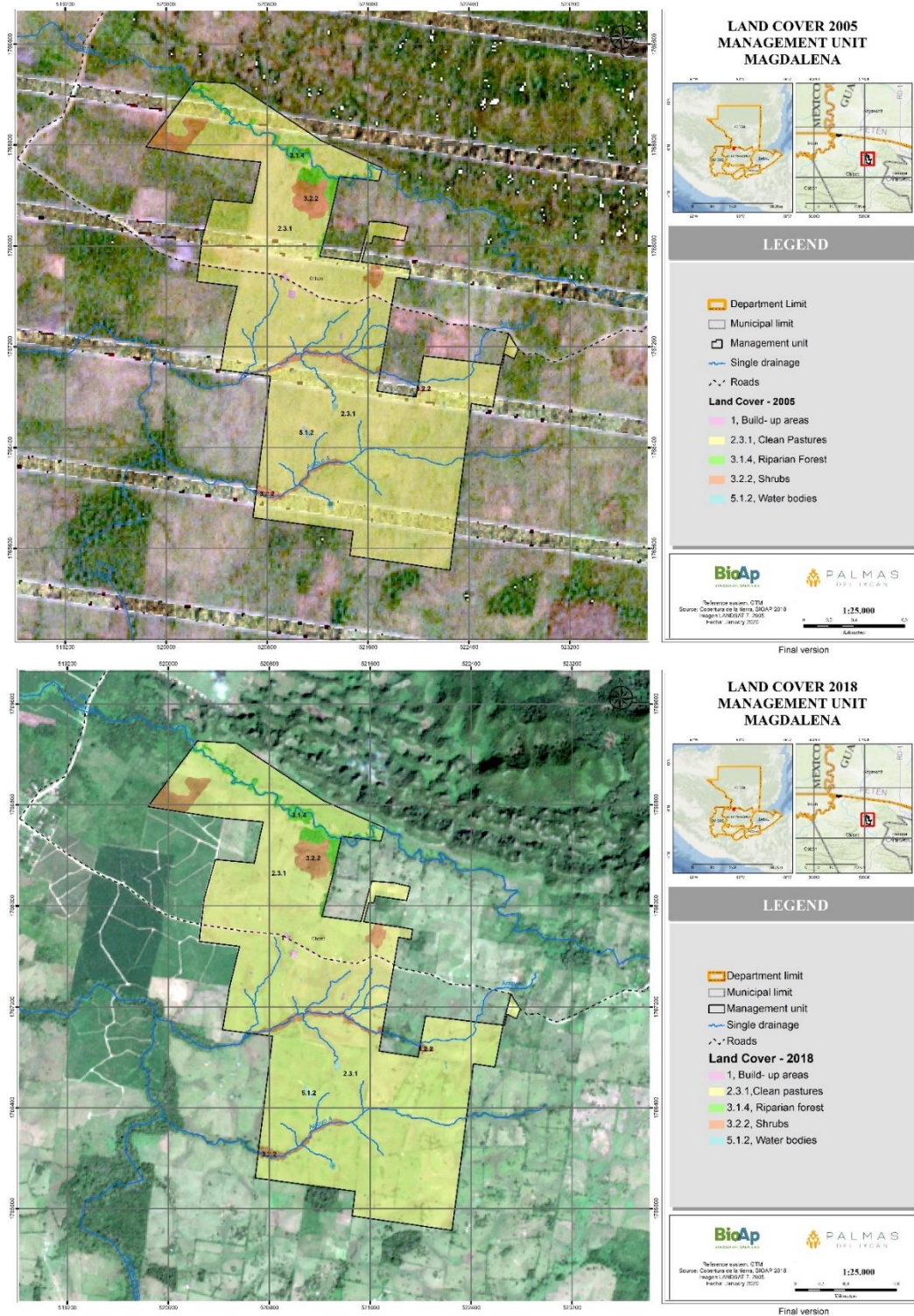
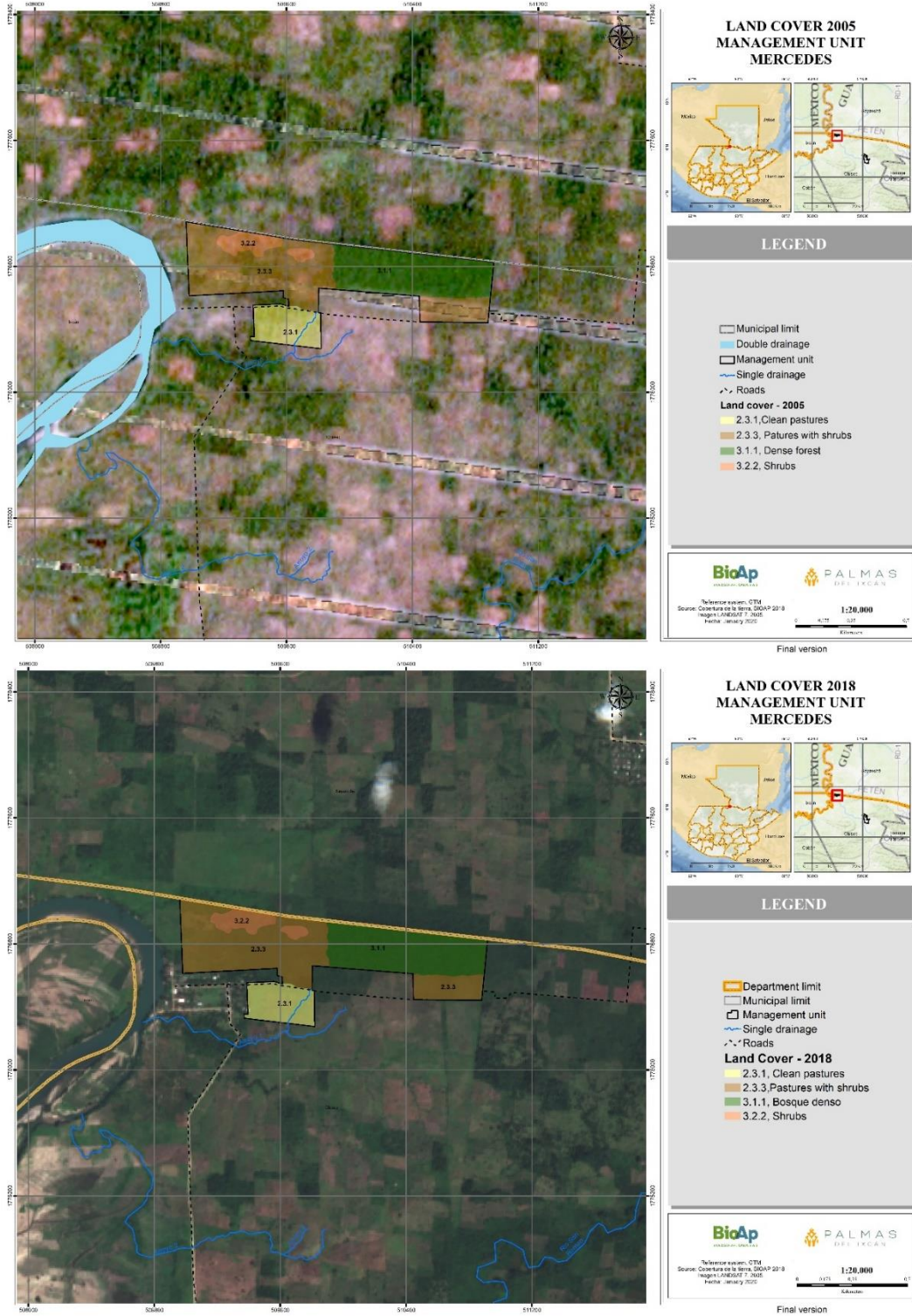*Figure 19. Maps of change of coverage in the Magdalena MU.*

Figure 20. Maps of change of coverage in the Mercedes MU.

3.3.6 HCV identified

Table 23 summarizes the main results of the identification of HCV areas in the Management Units evaluated for the company Palmas del Ixcán.

Table 23. HCV identification summary.

HCV	Findings		Present	Potential	Absent
	Description	**Location**			
HCV 1	Inside the AOII of Magdalena MU, the IBA-KBA Lachuá - Ik'bolay and Candelaria - Campur are considered as HCV 1, as well as the presence of 41,47 ha of gallery and riparian forest, 913,64 ha of dense forest, 62,14 ha of fragmented forest and 95,95 ha of secondary vegetation, for a total of 1.113,19 ha. Magdalena MU shows 12,96 ha of gallery and riparian forest which are considered as HCV. 15 species of flora, 2 reptiles, 3 mammals and 9 birds classified as RAP species were recorded. Inside the AOII of Magdalena MU, 93,61 ha of dense forest, 29,61 ha of fragmented forest and 55,49 ha of secondary vegetation for a total of 178,31 ha are considered HCV. In addition, in Mercedes MU a total of 26,78 ha of dense forest are considered as HCV 1 within which 40 species of flora, 4 species of birds, 3 species of mammals and 1 species of reptile were registered, of which 7 species of fauna and 6 Flora species were cataloged as RAP species.	Areas of Indirect Influence - Magdalena and Mercedes Management Units	■		
HCV 2	HCV 2 is considered absent at the landscape and Management Unit level because no ecosystems, mosaics of ecosystems or Intact Forest Landscapes (IFLs) were identified that would represent importance at a global, regional or national scale or that have the capacity to house viable populations of most species of flora and fauna.	-			■
HCV 3	HCV 3 is considered as the presence of the evergreen and semi-evergreen forest ecosystem that belongs to the great ecosystem of very humid and humid tropical forest, This has been found as in Critical Hazard. Magdalena M, shows a coverage of a total of 12.96 ha are considered evergreen, semi-evergreen and broadleaf forests ecosystem described as HCV 3, while in Mercedes MU 26,78 ha are considered the ecosystem are considered as HCV 3.	Areas of Indirect Influence - Magdalena and Mercedes Management Units	■		
HCV 4	HCV 4 is considered present at AOII and MU due to identification of riparian buffer zones of 10 meters for bodies of water with 5 - 10 meters wide and for lentic bodies of water, as well as riparian buffer zones of 50 meters for navigable rivers and spring water sources. These bands provide support and regulation services such as water quality maintenance, filtration of agrochemicals, protection of vulnerable slopes, erosion control and regulation of matter and energy flows. Likewise, the areas shows slope stabilization and protection of steep slopes were also	Areas of Indirect Influence - Magdalena and Mercedes Management Units	■		

HCV	Findings				
	Description	Location	Present	Potential	Absent
	considered as HCV 4 in the Indirect Influence Areas, due to the identification of 331,31 ha of areas with a very steep slope, where the inclinations of the terrain exceed the 25°.		■		
HCV 5	Water bodies belonging to Tzulusechaj river, Chixoy river, the spring water of Arroyo 1, the Sierra de Chinajá and some wooded patches located in community lands are identified as HCV 5. These correspond to sources of water supply for human and domestic consumption, fishing, recreational areas and for the development of agricultural activities of the communities of Mucbilha II and San Francisco de las Mercedes 2. In addition, the firewood extracted from the Sierra is recognized Chinajá and the wooded areas of community lands as a primary source for cooking, since the Yalmachac, Mucbilha II, Samaría, Serrania de la Bendición and San Francisco de Las Mercedes 2 communities do not have any alternate source for the development of this activity.	Areas of Indirect Influence - Mercedes Management Unit	■		
HCV 6	The site named "Las Pilas y El Tigre" is considered as HCV 6, being a ceremonial zone of the community of Mucbilha II, where they develop some practices typical of the Mayan tradition.	Area of Indirect Influence of Magdalena MU	■		

3.3.6.1 *HCV 1 – Species diversity*

In accordance with the definition of HCV 1 presented in the Generic Guide for the Identification of High In accordance with the definition of HCV 1 presented in the Generic Guide for the Identification of High Conservation Values (Brown, y otros, 2018), it was considered present in the AOII as well as in Magdalena and Mercedes MU due to the identification of gallery and riparian forests, dense forest and fragmented forest that are part of the evergreen and semi-evergreen broadleaf forest ecosystem with the capacity to host concentrations of biological diversity, mainly RTE species. Likewise, in the AOII of Magdalena MU, HCV 1 was considered present due to the existence of Important Bird and Biodiversity Areas (IBA) and Key Biodiversity Area (KBA) Candelaria-Campur in the north sector and Lachúa Ik'bolay in the south sector.

The AOII of Mercedes MU were considered as HCV 1 a total of 93,21 ha of dense forest, 29,61 ha of fragmented forest and 55,49 ha of secondary forest, for a total of **178,31 ha**. All these land covers are associated with the great ecosystem tropical humid and very humid forests since it includes the humid forests, low humid forests, evergreen forests, semi-deciduous moist forests, wooded lands and, wooded savannas. Despite their global extension and species-richness, the tropical humid forests are strongly threatened as a result of the loss of their habitat (Ofosu, 1998).

Mercedes MU was considered as HCV 1 a total of **26,78 ha** of dense forest in which a total of 40 species of flora, 4 species of birds, 3 species of mammals and 1 species of reptile were recorded whitin the land. From all, 6 species of flora, 1 species of reptile, 3 species of mammals and 3 species of birds were considered RAP. In regard to the palm (*Zamia variegata),* it is under category 2 in the national list of CONAP threatened species (CONAP, 2009), in Appendix II according to CITES and cataloged as endangered, given that wild populations have been rapidly reduced over the years, this being close to 50 % in recent decades (IUCN, 2018). Additionally, this species is almost endemic to Guatemala, since it is

distributed only in Mexico in the state of Chiapas and in Guatemala in Alta Verapaz and Izabal departments (Nicolalde, González, Vergara, & Vovides, 2011).

Another important record for the Mercedes MU is the cedar species *Cedrela odorata*, which is nationally and internationally threatened, being in category 2 of the CONAP national list of endangered species, in CITES Appendix III and cataloged as vulnerable according to IUCN. It is native of America, found from Mexico to northern Argentina, and has a reduction of its wild populations of 80 % in the last 10 years, as its wood is considered the second tropical hardwood with the highest value worldwide (Galván, Macedo, Núñez, Sánchez, & Octavio, 2018).

Regarding the species of fauna registered in the Mercedes MU, there is the register of the Roadside Hawk (*Rupornis magnirostris*), a species cited in CITES Appendix II, although is widely distributed from northern Mexico to Argentina. This means that it is not in danger of extinction unless trade is controlled; otherwise it could affect the survivorship of native populations. Likewise, the IUCN reports this species under the LC category, given that its range of distribution is wide and its populations are apparently increasing (BirdLife International, 2019a). In Guatemala, this species is not reported under any category of threat, given that its populations are stable.

In the **AOII of Magdalena MU** were considered HCV 1 the IBA-KBA Lachuá – Ik'bolay and Candelaria – Campur, as well as the presence of 41,47 ha of gallery and riparian forest, 913,64 ha of dense forest, 62,14 ha of fragmented forest y 95,95 ha of secondary forest, for a total of **1.113,19 ha**. The IBA - KBA Candelaria - Campur is an area that, despite the few ornithological records, has been classified as such due to the predominance of the humid evergreen forest and cloud forest ecosystems, which provide areas of rest, food and shelter essential for the flow of avifauna species restricted to the basin of the Gulf of Mexico, providing rest, food and shelter areas (BirdLife International, 2018c).

Inside **Magdalena MU** a total of 12.96 ha of gallery and riparian forest were considered as HCV 1, in which a total of 68 species of flora, 3 reptile species, 7 bird species and 4 mammal species were recorded. Within the flora species, 5 orchids were registered (*Catasetum integerrimum, Encyclia guatemalensis, Epidendrum rigidum, Pleurthallis sp.* and *Prosthechea cochleata*), which are reported in category 3 of the list of threatened species in Guatemala, indicating that they are not currently under threat, but they could become so if pertinent conservation measures are not taken. They are also listed under Appendix II of CITES, except for the species Pleurthallis sp. This is an important fact to highlight, given that the AOII of the Magdalena MU and the Mercedes MU are located within the Mesoamerica biodiversity hotspot, which holds the greatest diversity of orchids in the world. So, management and sustainable use, along with conservation strategies are a priority for the continuity of the orchid species registered. Moreover, the connectivity of the riparian forest coverage with those present in the Sierra de Chinajá is considered an element of great importance for the conservation and protection of the species of flora and fauna identified.

On the other hand, one of the fauna species with high importance was the black saraguato, *Alouatta pigra*, by the registration of a troop of three individuals in the riparian vegetation of the Magdalena MU, and in the Mercedes MU feces of this species were recorded. The distribution of this species is restricted to Mexico, Belize and northern Guatemala, countries in which deforestation is the main threat to the survival of wild populations of this species. This affects gene flow among isolated populations, since they are in the midst of a disturbed matrix, with areas of vegetation of very small size that decrease the probability of mating between troops, which could lead to inbreeding. (García del Valle, Estrada, Espinosa, Lorenzo, & Naranjo, 2005). According to the IUCN, this species is classified as threatened, with a tendency to decrease its populations, estimating that in a period of three generations (approximately 30 years) the population size will be reduced by 60 % (Marsh, y otros, 2008).

3.3.6.2   HCV 2 - Landscape-level ecosystems, ecosystem mosaics and IFL

The HCV 2 is considered absent in the AOII as well as in the Magdalena and Mercedes MU. According to geographic information about natural land cover (IGN & MAGA, 2010), the terrestrial ecoregions (WWF,

2012) and Intact Forest Landscapes (Potapov, y otros, 2016), no ecosystems with an area larger than 50.000 hectares were identified within the evaluated areas. For HCV 2 identification, the criteria by Brown, and others, 2018. Generic Guide for the Identification of High Conservation Values: intact and undisturbed forest landscapes, conservation landscapes and large sized areas not intervened.

The absence of HCV 2 dues to the fact that the Management Units and their respective Areas of Indirect Influence are located in a transformed area, with high deforestation rates, whose accelerating factors have been mainly the expansion of the agricultural frontier, the consumption of firewood and illegal logging, forest fires and anthropic intervention. This is supported by the annual rate of deforestation of 6.256,27 ha for the department of Alta Verapaz, 18.000 ha for the department of Petén and 3.579 ha for the department of Quiché, in which the evaluated areas are located. Similarly, in the AOII of Magdalena MU, there was a loss of forest cover of 15,24 ha for the period 2001-2017, while for the AOII of the Mercedes MU the loss of forest cover was estimated at 74,36 ha for the same period evaluated.

Likewise, it was not evident the presence of any Intact Forest Landscape within the MUs or its AOII, with the closest IFL being approximately 53 km from these areas.

3.3.6.3   HCV 3 – Ecosystems and habitats

HCV 3 is present in both the AOII and the Magdalena and Mercedes MU due to the identification of the evergreen and semi-evergreen broadleaf-forests ecosystem, which is currently threatened at the national level. This ecosystem is part a bigger ecosystem; the tropical humid and very humid forest that is in critical danger at a global level. The indicators for identification (Brown, and others, 2018) were used accordingly to The Generic Guide for the Identification of High Conservation Values were the presence of threatened ecosystems at national, regional or global level and WWF biomes and ecoregions present and their associated ecosystems. Thus, the evergreen and semi-evergreen broadleaf forest ecosystem considered HCV 3 occupies 12.96 ha in Magdalena MU, and 26.78 ha in Mercedes MU.

This ecosystem is represented in the tropical humid forest of Petén, whose ecoregion is also in critical danger and threat. The main factors of degradation of the ecosystem are those related to the land use change, forest fires, road construction, and urban settlements, as well as the overexploitation of the forest resources (United States Agency for International Development, 2002).

During the field surveys and land cover verification carried out in the Management Units, the presence of the tropical humid forests ecosystem was corroborated. Besides, the RAE allowed the identification of flora species typical of this ecosystem, such as *Bursera simaruba*, *Cedrela odorata, Ficus radula, Vochysia guatemalensis, Simarouba glauca, Terminalia amazonia* and *Blepharidium guatemalense*, in Mercedes MU.

As for the species registered in the Magdalena MU, which represent the vegetation typical of the broadleaved forest, it was found: *Gliricidia sepium, Vochysia guatemalensis, Bursera simaruba, Blepharidium guatemalense, Spondias mombim, Schizolobium parahyba, Dendropanax arboreus, Guatteria anomala, Brosimum alicastrum, Lonchocarpus castilloi, Manilkara zapota, Chamaedorea elegans, Pseudobombax ellipticum, Terminalia amazonia*; and as an important record, *Ceiba pentandra* species, with large specimens, corresponding to the original forest vegetation.

Finally, HCV 3 is considered present in the Area of Indirect Influence of Magdalena MU, specifically in the Sierra de Chinajá, where the presence of the great ecosystem tropical very humid forest and the ecosystem of evergreen and semi-evergreen broadleaf forests, was confirmed.

3.3.6.4   HCV 4 – Ecosystem services

According to the Generic Guide for the Identification of High Conservation Values (Brown, et al., 2018) HCV 4 was considered present in the AOII as well as in the Magdalena and MU Mercedes. The identification of buffer riparian zone which provides ecosystem services such as water quality

maintenance of its characteristics, regulation of the downstream flow regime, clean water supply, (especially in those areas where local communities depend on natural water bodies for the development of their daily vital activities), stabilization of slopes, water purification and filtration of agrochemicals, protection of steep slopes and climate regulation.

Riparian areas play a fundamental role in maintaining the water physicochemical characteristics quality, as well as in regulating the flow within the river basin because they cushion the entry of contaminants that result from the productive activity of the crop. of palm oil; riparian strips minimize the entry of diffuse pollution from this productive activity by exerting a filter role that favors the hydrological, hydraulic and ecological integrity of the riverbed, soil and associated vegetation, stabilizing the edges, regulating floods and avoiding increased surface runoff (Möller, 2011), thus decreasing the amount of sediments present in the water. Similarly, riparian areas also play an important role by connecting the landscape, especially in fragmented areas where the establishment of riparian strips can become an important source of essential connectivity for the preservation of genetic resources and habitat growth available for the flora and fauna species present in these areas.

Within the wider landscape (AOII) local communities take advantage of the water resource for different purposes. The type of use of rivers, streams and water sources by these communities are described in *Table 24*. Consequently, riparian areas or rounds of water protection were considered HCV 4 due to their significant and indispensable function to maintain quality and quantity of water supplied to the hydrographic system, fundamental attributes for local communities.

Table 24. Use of water resource reported by the communities present in the AOII.

Comunity	Type of use
MUCBILHA II	Tzulusechai River and births of the Sierra de Chinajá. Use of the water source for human consumption, domestic and agricultural use (irrigation of crops of corn, beans, cardamom and cattle drinkers).
YALMACHAC	Agricultural use in corn, beans, and fruit crops, as well as livestock watering holes.
SAN FRANCISCO DE LAS MERCEDES 2	Chixoy River Domestic use and irrigation of corn and bean crops, self-consumption and recreation fishing.
	Use of natural source of wáter for human consumption and domestic use.
SAMARIA	Use of water resources for crop irrigation.
SERRANIA DE LA BENDICION	Use of water resources for crop irrigation.
ESPERANCITA DEL RÍO	Use of water resources for domestic use and recreation.
SAN ANTONIO DEL ARENAL II	Use of water resources for domestic use and recreation.

For the delimitation of riparian buffer zones considered HCV 4, it was taken into account Guatemalan legislation called Technical Considerations and Proposals of Forest Management Standards for the Conservation of Soil and Water (Instituto Nacional de Bosques de Guatemala [INAB], 2003), as well as the thresholds of riparian buffer zones of the RSPO (Barclay, y otros, 2017). The evaluation team decided to use the threshold stipulated by the RSPO for water bodies between 5 and 10 meters wide. These corresponds to 10 meters of riparian strip, while for navigable water bodies and water sources present in both AOII as in the MU the threshold that dictates the national regulations corresponding to 100 and 50 meters respectively and which was used. The round of HCV 4 water protection covers 22,14 ha in Magdalena MU, and 1,11 ha in Mercedes MU.

3.3.6.5   *HCV 5 – Community needs*

In accordance to the Generic Guide for the Identification of High Conservation Values, HCV 5 contemplates fundamental sites and resources to meet the basic subsistence needs of local communities and indigenous peoples (Brown, and others, 2018). Therefore, HCV 5 was considered present in both Indirect Influence Areas and in Mercedes MU due to the water sources characterization and the Sierra Chinajá, which provide indispensable services for the subsistence of the communities present in the evaluated areas. Having as support the results of consultation with interested parties in participatory workshops, interviews, surveys, and secondary information such as demographic data, population

occupation, economic activities of the departmental, local development plans, reports of the Secretary of Territorial Planning and other studies carried out in the zone.

In the **AOII of the Magdalena MU**, HCV 5 was considered present due to the identification of the Tzulusechaj River, the main water source for the Mucbilha II community. Thanks to this river, they can satisfy the services of food preparation, housework, irrigation of crops, fishing and recreational use. This information was ratified by the communities of Yalmachac, Samaria and Serrania de la Bendicion. The use of the river is limited practically to the community's area since downstream the flow is reduced by environmental conditions, which makes it difficult for other communities to take advantage of it. In addition, in the **AOII of Magdalena MU**, the Sierra Chinajá was identified as HCV 5 due to its importance as a wood source for the communities of Samaría, Serrania de la Bendicion, Yalmachac, and Mucbilha II, that do not have alternative mechanisms for food cooking, and the collection of this resource in the plots is insufficient in relation to the inhabitants demand.

In **Magdalena MU**, HCV 5 was considered absent as no subsistence use of the resources present was identified by the people consulted. This could be a result of the concept of private property that restricts communities (or others than owners) to access to resources that were not previously established community use. However, the communities' high demand of firewood for cooking food, puts at risk the scarce forest cover within the MU.

In the **AOII of the Mercedes MU**, is currently consider as HCV 5 due to the water consumption of the Chixoy River by the San Francisco de las Mercedes 2 community, for the purpose of supplying drinking water and food through fishing, domestic and agricultural activities such as washing, irrigation of corn and bean crops and species production minors (pigs and birds). Likewise, patches of secondary vegetation located in the jurisdiction of the San Francisco de las Mercedes 2 community (plots) are identified as HCV 5, since they are considered as the sole source of wood for the development of domestic activities such as preparation of food. However, it is important to clarify that the forest area within Mercedes MU is considered a reserve area since the time of conformation of the village despite the fact that some inhabitants of the area extract firewood from there. The community states that it is necessary that the company and the members of the community do not carry out logging or logging activities, in order to maintain the fauna and the natural source of water from which the community is supplied. Mercedes MU, HCV 5 is considered present due to the identification of the birth of water in Arroyo 1, of which 75 families in the San Francisco Village of Las Mercedes 2 make use of the water resource for human consumption and the development of some domestic activities, since they do not show an aqueduct system or other water sources that guarantee water quality and the health of its inhabitants. During the consultation, the members of COCODE manifest that for access to this water source it is necessary to cross part of the MU, for that the establishment of agreements between the parties was required, in order not to affect the dynamics of the community and to avoid damaging the property. In addition, the meeting raises the importance of protecting this water source from possible pollutants (agrochemicals and fertilizers) that put water quality at risk, therefore, they propose to have special handling at the time of planting that allows having a buffer zone with vegetation. In the field verification of this area, little forest cover was identified putting at risk the maintenance of the water spring.

3.3.6.6   HCV 6 – Cultural values

The HCV 6 is considered present only in the AOII of Magdalena MU. Taking into account the information collected in the participatory consultations, the interviews with the communities of the evaluated areas and the review of archaeological sites declared by UNESCO and the Ministry of Culture and Sports of Guatemala, a site of traditional importance called "Las Pilas y El Tigre", were identified. Both are found in the Sierra de Chinajá. According to the Generic Guide for the Identification of High Conservation Values, HCV 6 includes significant sites, resources, habitats and landscapes at a global or national scale for archaeological or historical, cultural, ecological, economic, religious or sacred importance, reasons that

are critical to the traditional culture of the local communities or indigenous peoples that inhabit the area (Brown, y otros, 2018).

During the participatory mapping, the Mucbilha II community identified two sites of traditional importance located in the Sierra de Chinajá called "Las Pilas y El Tigre", where they perform ceremonial activities of the Mayan culture, that reflect the Q'eqchi worldview by its deity Tzuultaq'. These sites were considered given the organization characteristics of the Mucbilha II Village in which, within the community, they have the presence of indigenous authorities, elders and ancestral leaders, who perform ceremonies such as El Nacimiento and Casamiento.

In addition, during the development of the individual surveys of a sample of 36 families of the Mucbilha II community, 89% of the sample recognizes the presence of traditional sites that deserve to be protected which are: Cerro La Bendicion, Las Pilas y El Tigre, Cerro La Monja, Sierra Chinajá and Communal graves. There are four graves inside the Mucbilha II village, where Mayan ceremonies and rituals are held.

Furthermore, the community reports that in sites where the surveys were conducted, ceremonies and rituals typical of the ethno-linguistic group Q'echi' take place. Some of the mentioned are the ceremonies for harvesting corn, beans and cardamom, which are carried out in the community hills or in the plots (17% of the answers). As well as Mayan ceremonies and rituals that are carried out in caves inside and at the shore of the community, in the Sierra Chinajá, in the cave and waterfall "Las Pilas" and the hill Cejish or "El Tigre" (39 % of the answers).

In the AOII of the Mercedes MU, as well as in the Mercedes MU, no sites of cultural or ancestral importance or archaeological findings were identified that could be considered as HCV 6. San Francisco de las Mercedes 2 communities relates sacred sites as the constructions of the Catholic or Christian church. In addition, some type of fauna or flora species that has the concept of sacred or ceremonial are not identified.

3.3.7   Summary of HCV areas

Within the Magdalena and Mercedes Management Units, the HCV 1 and HCV 3 areas comprise an area of 39,74 ha, the HCV 4 areas cover 23,28 ha and the HCV 5 area comprises 0,02 ha (*Table 25*) . However, taking into account that there are cases in which one area can correspond to two HCV categories (for example, HCV 1 and HCV 3 areas simultaneously), the net HCV area subtracting overlaps corresponds to 59,14 ha. *Figure 21 and Figure 22* show the summary mapping of the HCV areas identified in both the MUs and their respective IIAs.

Table 25. Summary of HCV areas in MU.

| Management Unit	HCV	Land cover	Area (ha)
MAGDALENA	HCV 1 y HCV 3	Riparian forest	12,96
	HCV 4 (riparian buffer zone)	Shrubs	3,88
		Riparian forest.	4,25
		Water body	0,03
		Clean and cultivates pastures	14,01
Total Magdalena MU			*35,13*
MERCEDES	HCV 1 y HCV 3	Dense forest	26,78
	HCV 4 (riparian buffer zone)	Clean and cultivates pastures	0,25
		Clean and cultivates pastures	0,86
	HCV 5	Clean and cultivates pastures	0,02
Total Mercedes MU			*27,91*
Total HCV areas			***59,14***
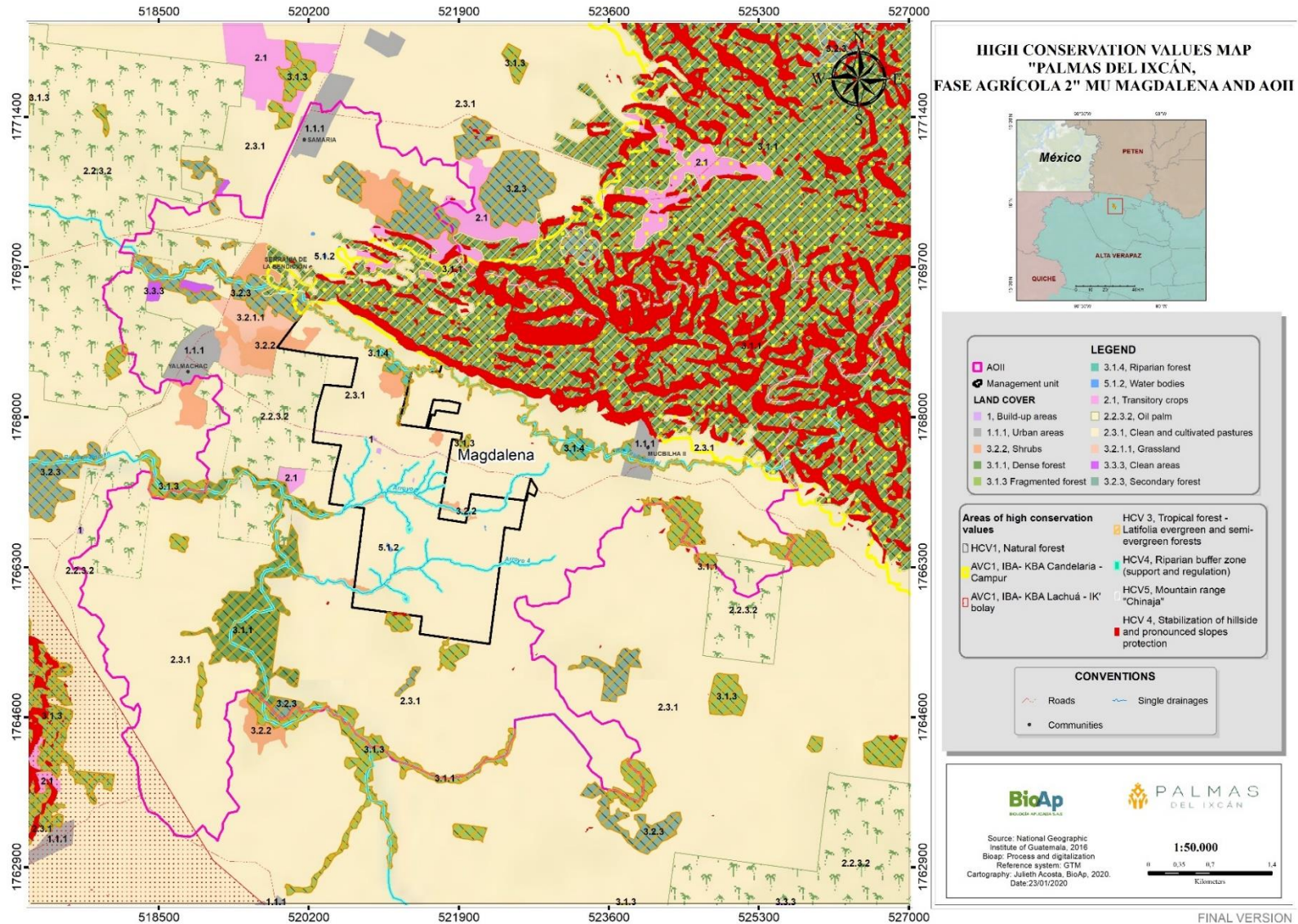
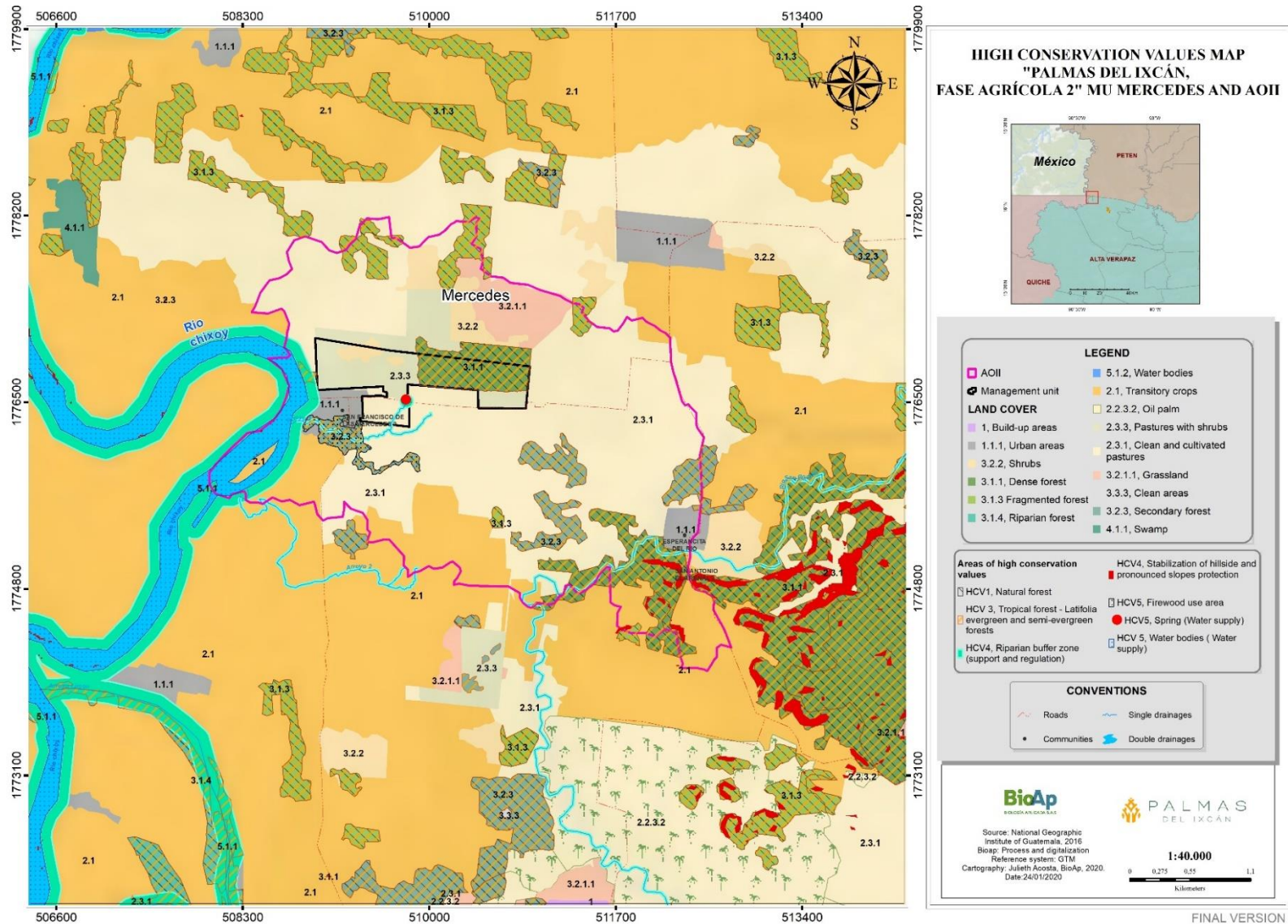*Figure 21. High Conservation Values (HCV) map of Magdalena MU.*

Figure 22. High Conservation Values (HCV) map of Mercedes MU.

3.3.8   Stakeholder consultation

The participatory process developed with the stakeholders identified in the area of influence of the Magdalena and Mercedes MUs was carried out through the implementation of the tools inherent to this approach, in order to capture relevant information for the identification of HCVs 4, 5 and 6. To do this, the approach or issues to be addressed with its different categories were defined as it appears in the *Table 26.*

Table 26. Population or group of interest.

Stakeholder	Methodological tools	Approach
Communities	*Participatory mapping:* - Resource Inventory Map - Current situation mapping. - Surveys - Semi-structured interviews	- Life conditions, economic activities, access and use of resources, perceptions of palm cultivation. - Presence of fauna and flora species - Hunting and fishing activities. - Archaeological evidence or sites of cultural or ancestral importance.
Neighbor producers	Surveys - Semi-structured interviews	- Land use changes - Use of resources (water, fauna, flora) - Conflicts over land tenure and access to resources - Perception about new plantings.
Government entities	- Formal and semi-structured surveys	- Environmental protection areas, fauna and flora species, palm cultivation affectations. - Land use and current economic activities - Conflicts with land tenure - Archaeological sites or of ancestral importance.

In regards to the approach of each of the participants, it is necessary to clarify that, the category of the communities (Mucbilha II, Yalmachac and San Francisco de las Mercedes 2) needed form help of interpreters of the Q'eqchi 'language was essential - Spanish that allowed the dialogue with the speakers of the Q´eqchi´ language, therefore, it was necessary to implement techniques to channel the information of the focus groups. As for the individual approach of some inhabitants, a survey was designed and interviews were held, taking into account the characteristics of the territory previously identified.

Table 27. Summary of the results of the stakeholder consultation.

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
Neighbors	Genaro Caal Chu Alberto Choc Chub	Owners	The rapprochement with Mr. Genaro Caal and Mr. Alberto Choc was developed through a semi-structured interview supported by cartography of the Magdalena MU, and a property map of the Yalmachac community. There the property boundaries were identified. The new planting land was purchased to the Moscoso family, whom in turn made its purchase to different owners of the same community, which they sold to obtain land in another place instead. They used to be ranchers. They comment that the first settlers of the area were the community of Yalmachac arriving towards the year 1976, later the Mucbilha II village was settled and then in the year 1998 the community of La Bendicion invaded the Sierra de Chinaja. They say that the Sierra de Chinajá is an important site and that their ancestors had it as a reserve until the inhabitants of La Bendicion arrived. In addition, they report that 20 years ago there were traces of tigers (big cats), but after the arrival of the community of Mucbilha II and La Bendicion, with the planting of cardamom, many species are no longer evidencied.. Likewise, in the Sierra de Chinaja about 15 years ago, a forest fire displaced a large part of the species. Regarding the conditions of the community, there are 89 families with an average of 4 to 6 members (migrants due to the effects of the conflict), dedicated to the palm, livestock and crops of fruit and basic grains (beans and corn). The supply of food occurs through trade with intermediaries, since in the area the production of these is almost zero, therefore, malnutrition of children occurs. The only means of cooking food is firewood, which is extracted mainly from plots and the Sierra, since there is great demand for it. The water consumption is generated by means of pipes supplied by the oil company. Finally, they comment that fishing and hunting are not carried out, since natural resources do not allow it.	The conditions of the Tzulusechaj River in the MU limit were verified and the information captured in the field is recorded. Management recommendations for conservation are included in the vicinity of the Sierra Chinajá and riparian protection zones within the Magdalena MU.
Oil palm producer /Neighbor	Julio Cesar Rodas Flores	Entrepalmas plantation manager	The company Entrepalmas corresponds to an oil palm company (2084 Ha) that is adjacent to the Magdalena MU, which has an approximate 425 workers, being 95% part of the community. During the rapprochement with the plantation administrator, discussions were held on aspects related to the environmental conditions of the area. First, he says that the soils of the area are mainly clayey and rocky, which requires special management and recognize the presence of	The corroboration of species identified in the consultation is done, with the findings generated in the field (verification of forested areas). The information for the HCV

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
			the San Roman River and the Tzulusechaj River, as important water sources for the communities. However, they have a low flow because of the season and lack of plant cover. Commented that within the plantation there are reserve areas, where species such as deer, tacuazines, tepescuincle, snakes, among others, have been evidenced, making it clear that a few years ago the population did hunting activities but has not been registered, which should not be ruled out as a threat to the new plantations. The administrator does not identify nearby important ancestral cultural sites, only reports El Sauce River, where they carry out tourist-recreational activities, but it is far from the area under study.	analysis is contemplated.
Neighbor	Guillermo Sacul	Owner	The interview was about the relationship of the NPP area, with Mr. Guillermo's plot. Mr. Guillermo expresses his concern for two situations, the first one is that the access to his land is done by the trails that are inside the MU and the second by the water quality of the Tzulusechaj River, important water source for the supply and maintenance of crops and animals, which may be affected by the application of agrochemicals during the development of new oil palm plantings. He did not report any other information relevant to the study.	Identification of the areas where access to Mr. Guillermo's land is made, to give proof of the commented. It is determined to carry out reforestation and maintain buffer strips for water sources within Magdalena MU.
Samaria and Serrania La Bendicion comunities	Bartolo García Gómez / Arnoldo Caal, Other participants	COCODEs members	The COCODE members of both communities commented during the meeting that they consider important this initiative of the Palmas del Ixcán, for which they are willing to support and work along with the Company. They ratify the importance of Sierra Chinajá since it is a source of resources for communities, such as firewood and Cardamom crops. They recognize the need to protect ecosystems to maintain water in the area, as it is scarce. Therefore, it is necessary to identify streams within the MU and protect them by planting native trees. Based on a previous conflict they had with another palm company, they are concern about the possible fish mortalities and water sources contamination by agrochemicals, with the development of new plantations. They recommend protecting the Sierra Chinajá, as well as water sources, avoiding situations such as the one presented 15 years ago with the Sierra's forest fire.	A field visit to the mountain is agreed with the community, in order to identify ecosystem conditions and the relationship with Magdalena MU. On September 23 with the support of the Yalmachac community, the identification of wooded areas and streams within the Magdalena MU is made. It is included as a management recommendation the realization of reforestation

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
			In addition, they suggest informing the community of the activities to be carried out at Magdalena MU.	activities and riparian buffer zones for the water sources present within the Magdalena MU.
San Francisco de las Mercedes 2 community	José Cuc Chocooj/ Pedro Hoc Ical, Other participants.	COCODEs members	The approach with the community of San Francisco de las Mercedes 2 was carried out in two moments: the first one with the COCODE members, where an exercise of participatory cartography was carried out; and the second with members of the community, where individual interviews were conducted with 8 people. Some of the reported findings are: - The community is composed of 75 families, dedicated to the planting of corn and beans, livestock and pig and poultry production, fishing, and several labors at oil palm plantations. It was established in 1994 due to the need of land access. - They recognize the importance of the Chixoy River, where they carry out domestic activities (washing, bathing, home cleaning), fishing and recreation. - They identify a water spring within the Mercedes MU, which represent the water intake for them since they do not have an aqueduct service. Therefore, they consider necessary for the company to protect it and guarantee that the water quality is not affected - They identify a wooded area; considered a reserve, inside the MU, nevertheless, some people extract firewood from it for consumption. - The community develops fishing activity in the Chixoy River for self-consumption and commercialization. Some species named are tilapia, mojarra, and "machaca" (Brycon guatemalensis). They said that in the river there is a plague called "Pez diablo" (Devilfish), which has displaced other fish species and is not consumed because it is considered unfit. - In regard to living conditions, they say that al the population cooks with firewood extracted mainly from their plots, they do not have proper handling of garbage and sewage. They have elderly people and a midwife, but they do not have indigenous authorities belonging to their Mayan worldview. - They do not identify sites of ancestral importance such as caves or mountains. They only refer to the Catholic and Christian churches where they perform their religious activities.	Verification of conditions of the water spring and the mountain (forest cover) within the Mercedes MU. The agreements established in the minutes of the community assembly are accessed. Cartographic information for the definition of HCV is corroborated. It is included in the management recommendations, reforestation strategies and delimitation of the forested area and the water spring present within the Mercedes MU.

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
Mucbilha II Community	Community inhabitants	Community inhabitants	In the participatory mapping with the Mucbilha II community, the following aspects were identified: - The community is composed of 96 families, mainly dedicated to the cultivation of corn, beans, cardamom, bananas, sweet potatoes, and cassava. They do not carry out hunting activities and fishing is not possible since the Tzulusechaj River does not have enough flow to develop this activity. - They recognize the Tzulusechaj river as a water supply for consumption, domestic activities (washing), recreational activities and agricultural use. It is a very important source, as they do not have other means of obtaining water, especially in summer. - They manifest that the Sierra Chinajá is an important conservation area since it provides firewood resources for its inhabitants. Also, within it are ceremonial sites typical of the Mayan culture as the La Pila y Hix (Tiger), where they perform ceremonies about the planting of crops and births. - They recognize that some species of fauna and flora are seen in the mountains, like Fauna: Black howler monkey, toucan, lowland paca, jaguar, snakes, squirrel, and peccary, among others. Flora: Macuy (*Solanum nigrescens*), "palo de chico", sapote or soapapple, and the seed of sugar-apple. - Finally, the protection of water sources is suggested to avoid water drying through the conservation of forests.	Community living conditions are verified and potential HCV 5 and 6 are identified. Management recommendations for the areas within the Magdalena MU that could be possibly affected by the operations of the company Palmas del Ixcán are included. Among which are: reforestation of water sources, delimitation of riparian buffer zones, and implementation of the No hunting, No fishing, No logging policy. The creation of clear communication channels with COCODE members is proposed.

	Community inhabitants	Community inhabitants	36 surveys were developed with different families of the community, in which they were asked about the living conditions and the presence of important cultural sites
			As results were obtained:.
			- The main sources of water supply for human consumption are deep artesian wells and the Tzulusechaj River.
			- 91% of the people express that they do not practice hunting; however, the remaining 9% indicate that they do this activity for family consumption. Similarly, it is identified that 13% of the sample surveyed carry out fishing activities for self-consumption purposes.
			- 88% of the sample recognizes that they perform ceremonial or ancestral activities. Within the customs or traditions are two very important:
			  • Ceremonies for the planting of corn, beans and cardamom, which are carried out in the community hills or in the plots.
			  • Mayan ceremonies and rituals, which take place in caves inside and on the edge of the community, in hills, in the	

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
			Chinajá mountains, in the cave and waterfall "Las Pilas" and the Cejish or "El Tigre" (The Tiger) hill. - 86% of the sample identifies sites that should be protected and conserved, given their importance both for the subsistence of the community and for their culture. Among which are mentioned: Springs or sources of water, the hill La Bendicion, Las Pilas y El Tigre, La Monja hill, Sierra Chinajá and communal caves (there are 4 caves inside the Mucbilha II village, where Mayan ceremonies and rituals are held).	
Comunidad Yalmachac	Community inhabitants	Community inhabitants	The consultation was carried out in a community assembly, where participatory cartography was implemented through which the following aspects were identified: - The community is mainly dedicated to work in the oil palm crops, the planting of corn, cardamom, beans and pineapple, as well as to livestock. - The community makes use of firewood extracted from the plots and the Sierra Chinaja, as the only mean of cooking food. - The community recognizes the importance of the Sierra Chinajá and the Tzulusechaj River in the preservation of species such as snakes, ocelot, raccoon, lowland lapa, coatis, opossum, deer, and peccary; as well as for water supply for nearby communities. - Participants mention that within the Magdalena MU, there are small springs and streams that supply the neighboring plots, however, they do not have enough forest cover and that is why they dry in summer. Among the suggestions are: - Do the verification of springs and water sources together with the current state of the forest cover within the Magdalena MU. The visit was set for September 23rd, in the company of the representatives designated by the COCODE. - Carry out actions to protect water sources and forests within the MU. - Guarantee the free transit of people that require passing through the MU to get to their lands.	Identification of wooded areas and streams within the Magdalena MU, on September 23rd, was done with the support of the Yalmachac community. The suggestions made in each of the activities carried out for the design of the management recommendations such as reforestation along water sources, delimitation of riparian buffer zones, implementation of policies of No hunting, No fishing, No logging will be taken into account.
	Community inhabitants	Community inhabitants	27 surveys were developed with different families of the community, in which they were asked about their living conditions and the identification of cultural importance sites. As a result, it was obtained that: - The community is supplied with water through an aqueduct system provided by an oil company. - 100% say they do not practice hunting, and 11% of respondents	

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
			carry out fishing activities for self-consumption. - 55% of the sample reports that it obtains an economic income of the work in the oil palm companies, for the level of productivity of the land is minimal, even so, 33% is dedicated to working in its plots or neighboring parcels. - Concerning the performance of ceremonial or traditional activities, 88% report that no activity of this type is carried out in the community, while the remaining percentage say that they do activities to bless the land for the planting of corn, beans, and cardamom. - Respondents do not report sites or areas of importance for conservation. - Among the suggestions made is mainly the protection and non-contamination of water sources.	
	Community inhabitants	Community inhabitants	In accordance with what was proposed in the Community Assembly, on September 23 a field visit was done inside the Magdalena MU, in order to identify the forest cover state and the water sources present in it. The tour was carried out on the Tzulusechaj River which borders the Magdalena MU. It was performed with the company of COCODE representatives and personnel from the company Palmas del Ixcán. During the trip, it was determined that the area corresponding to Palmas del Ixcán has weak forest cover and that the river has a low flow. It is indicated that during the summer season the river dries up, so the environmental management engineer from Palmas del Ixcán says that water quality sampling will be carried out and that appropriate measures will be taken to guarantee and preserve the resource.	
Chisec Health District c	Elio René Chum Estrada	Health Technician	The dialogue with the representative of the Chisec Health District helped the contextualization at the municipality level of several aspects to consider: The population of Chisec, is dedicated mainly to the cultivation of Cardamom, in addition to cultivating corn, beans, fruit trees and the dual-purpose livestock production and pigs. There are high birth rates of 10 - 12 children and mortality of mothers and children, due to the maintenance of idiosyncrasy (birth by midwife) and the difficulty of accessing food. The municipality of Chisec does not have garbage and wastewater management mechanisms, which generates the proliferation of vectors and the contamination of water sources as Chixoy River. Talks about the importance of the Sauce River as a recreational	Verify legal conditions for the establishment of new plantings. Generate agreements with the surrounding communities in favor of the protection of HCV areas.

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
			tourist area for several communities such as Yalmachac and Samaria. Some of the most frequent complaints to the palm sector are the contamination of water sources, rivers diversion, flies presence, reduces soil productivity, and incite fish mortality. For which it suggests to comply with what the norm demands and to attend agreements with the communities to avoid conflicts.	
Secretariat of Agricultural Affairs - SAA	Participaroty workshops	SAA Representatives	The dialogue with the SAA officials was developed around three themes: Appropriateness of land use and legal land tenure. They refer that the areas of Yalmachac, Mucbilha II and Carolina have tenure conflicts because there are several land claims, regarding the appropriation of land by external persons, as well as the purchase without registration before the cadastre. For this reason, they suggest verification of this situation with the competent entity. Sierra Chinajá. He says that this area corresponds to a reserve area registered with the CONAP, although there are 14 communities settled in it, planting cardamom. Natural resources. They express concern about the possible contamination of water sources, due to the application of agrochemicals and the diversion of water through channels. This concern is supported by the complaints filed with another palm company.	Verify legal conditions for the establishment of new plantings.
Ministry of environment and natural resources	Teodoro Toc Ac	Coordinator	During the interview with Mr. Teodoro Toc, he presented some affectations that have generated the environmental deterioration of protection zones, such as deforestation, contamination of water sources by application of agrochemicals and fertilizers, change in land use due to the advance of the agricultural frontier, loss of fish and displacement of species. It reports that, as an institution, programs are being generated for the protection of forested areas called "forest incentives", as for capacities building and training activities focused on conservation, developed by the Department of Environmental Education with schools and communities. He refers that it is necessary to comply with Decree 68/86 and government agreement 1037/2016.	The need to verify the legal conditions for the establishment of new plantations, as well as the current conditions of land use for Magdalena and Mercedes MU, are taken into account.
National Institute of Forests	Rony Vaides Medina	Subregional II Director	The interview with the director of the INAB allowed taking into consideration several aspects related to the territory current conditions. Firstly, it was stated that the oil palm activity is allowed according to what is established as possible land uses, however, as it is a monoculture it generates disturbances to biological corridors, such as Sierra Chinajá and Sierra Rubén Santo.	Perform forest area verification to establish connectivity strategies between the mentioned mountain ranges (Sierras).

Social group/ organization	Name	Position/ function	Results: recommendations/ suggestions	Response of the evaluation team
			Furthermore, they comment that the area has been highly transformed, due to the advance of the agricultural frontier, consumption of firewood, inadequate land use, and population growth. Finally, they refer as an institution to reforestation programs and training for the protection of forest areas, through incentive programs.	Count with the institute to generate alliances that promote the reforestation of weak forest covers, with native species.

3.3.9   Final stakeholder consultation

According to the results obtained from the analysis and recommendations in each HCVs present in the study, the presentation of results was carried out to the social actors that are related to the protection of these identified areas. However, this process was not developed with the National Forest Institute (INAB) and the Chisec Health District, due to difficulties in contact and time availability of the representatives of these interested parties, because despite the fact that the company sought to generate the space for the final consultation of results and findings, it was not possible to obtain an answer in favor of the approach.

In addition, the management for the consultation with the Mercy Corps organization was developed, through contact by email and telephone, at dates after the final consultation phase developed with the other interested parties (November 27, 2019), however, no response was obtained from the NGO. Therefore, the management recommendations stipulate that before starting the sowing work or other project activities, the results of the study should be consulted with these interested parties in order to know their opinion on the management measures to be implemented and be able to include your perceptions, thus avoiding any conflict over your rights.

During the final consultation of results and findings, emphasis was placed on obtaining new suggestions in relation to HCVs 1, 3, 4 and 5 regarding the protection of natural resources and the forest cover present. The results presented include draft maps on the identified HCV areas, land cover maps, IIA and UM maps, stakeholder maps and management and monitoring recommendations for the HCV areas.

Table 28 shows the social actors involved in the development of the presentation and the observations suggested by each of them.

Table 28. Presentation of results and findings of the HCV study.

Stakeholder	Development of the activity	Observations	Response of the consulting team
Yalmachac Village 10/11/2018	This community was attended by three members of COCODE, the following process was carried out: Objective, making known that the purpose is to share the findings of the field activities carried out. Explanation of the five HCV identified and which are in the area of the Yalmachac community. Brief explanation of the way of handling each HCV.	They request to support and maintain communication with COCODE. They indicated that the company should consider that the road leading to the project area is for public use but does not have a legally constituted easement.	The observations are integrated into the socio-environmental impact study, as part of the strengthening of the communication channels and the establishment of agreements for the use of easements for the use of land neighbors.
Mucbilhá Village 12/11/2018	This community was attended by more than 20 people, the following process was carried out: a.Objective, making known that the purpose is to share the findings of the field activities carried out. b.Explanation of the five HCV identified and which are in the area of the Mucbilhá II community. c. Brief explanation of the way of handling each HCV.	They recommend protection of water sources, although they were told that the bodies of water where they are supplied are outside the management units.	According to the comments, 10 meter buffer strips are defined for water bodies between 5 and 10 meters wide, which applies to the Tzulusechaj river, in order to guarantee protection against new developments.
San Francisco de las Mercedes 2 Village	The meeting with the members of COCODE is subdivided into three parts:	Participants ask about the road of use for the transit of fruit and its	In response, the vegetation patch in the MU is defined as

Stakeholder	Development of the activity	Observations	Response of the consulting team
12/11/2018	In the first instance, the purpose of the meeting is explained and community meetings are reminded of the meetings held during the consultation phase. Then, we proceed to show the results obtained in the study and the strategies for the management of the HCV inside the Mercedes unit are exposed. Finally, the suggestions are received and agreements are established with the community members.	maintenance. It is said about the forest patch can not be felled by the community or the company. They expose the importance of taking care of the birth of water.	HCV 3, which implies maintaining a buffer of 20 meters by recovering the natural vegetation (reforestation) so that a natural barrier is created between the vegetation patch and Palm oil plantations. In addition, a 50-meter round of protection is proposed around the area of the water source of the UM Mercedes.
MARN Alta Verapaz Regional Headquarters 13/11/2018	There were three advisers from the Environmental Management unit who are responsible for analyzing and ruling on the records of environmental instruments. A PowerPoint presentation was prepared where general aspects of the Project, information gathering methodology, identified HCV and summary of social impacts were announced. The engineer Ana and Mr. Odilzar were expanding information on the environmental and social policy of PI Limitada. The presentation indicated that information on the HCV findings was being submitted	Some recommendations were: Perform water monitoring in Mucbilhá II. Perform hydrogeological study. Consider that the possibility that water monitoring be participatory, that when collecting the samples, community leaders, health personnel and municipality are present.	Regarding the observations made, it is defined to develop a monitoring and follow-up schedule for water treatment processes and to comply with the regulations established for such purposes. It also integrates the design and implementation of environmental programs in conjunction with the different social actors.
Chisec Ministry of Agricultural Affairs 13/11/2018	The presentation of results was carried out with the regional coordinator of the secretary to whom the following information was presented: a. Objective, making known that the purpose is to share the findings of the field activities carried out. b. Explanation of the five HCVs identified and which are found in each of the MUs. c. Brief explanation of the way of handling each HCV.	He suggests taking into account the buffer zone between the Chinajá mountain range, the Tzulusechaj river and the crop. Considers the protection of the identified species of great importance.	According to the comments, 10 meter buffer strips are defined for water bodies between 5 and 10 meters wide, which applies to the Tzulusechaj river, in order to guarantee protection against new developments. Management recommendations are defined against the species reported in the HCV 1.
Samaría y Serranía de la Bendición Villages 03/03/2019	The meeting was attended by 10 representatives of the members of the COCODES, where the reason for the meeting and the results obtained in the study through the use of photographs and maps are explained. The concerns raised are clarified and the minutes of the strategies proposed	The following aspects are proposed to be integrated in the management recommendations: Take care of the water in the area with reforestation of riparian	The proposed activities are integrated into the management recommendations of HCV 1, HCV 3, HCV 4 and HCV 5, complying with the

Stakeholder	Development of the activity	Observations	Response of the consulting team
	by the community members are made.	areas. They comment that the forest patch of the Sierra Chinajá is part of community use.	request of the participants.
National Council of Displaced Persons of Guatemala – CONDEG 19/12/2019	Contact was made with the NGO coordinator via email, where the Phase II Agricultural Project of Palmas del Ixcán was informed and their opinions were requested regarding the issue. For this, a digital questionnaire was delivered, which was resolved in writing and sent by mail.	Some comments obtained through the questionnaire filled out by the NGO representative were: It considers that the palm sector has caused a cultural shock, since it has generated a break between the traditions carried out in community lands, due to the sale of these for the establishment of palm. In addition, it recognizes the loss of food security in Q'echi´ communal areas, as there is displacement of traditional crops such as corn and beans. Regarding the recognition of areas of environmental importance, it identifies the Sierra Chinajá, water sources such as the San Román River and the Chixoy, where the community members develop fishing activities and supply water for domestic purposes. It denotes the importance of complying with the agreements defined with COCODES, emphasizing respect for easements and natural areas.	The observations are integrated into the socio-environmental impact study, as part of the identification and management of potential effects on communities. Likewise, the establishment of agreements for the use of easements of use of land neighbors is defined. In addition, areas of vegetation and water sources are recognized as HCV.

3.3.10 HCV Management and Monitoring
3.3.10.1 Threat Assessment

The identification and evaluation of the threats were developed considering the consequences or negative impacts that may occur, in relation to the HCV areas identified in the Management Units proposed for the development of new oil palm plantations. These threats, as well as their impacts, were identified taking into account the temporal and spatial scales in which they develop or can be developed, with current threats being those that are certain to occur in the areas evaluated, and potential threats those that can be generated once the new developments begin.

All the threats were identified and classified according to the results obtained from the study areas characterization and the outcomes of the stakeholder consultation, which included the main considerations and concerns of the communities about the establishment of new oil palm developments. Likewise, the threats proposed by the evaluation team were also embraced based on the experience of them in other evaluations related to the oil palm sector. Other specific observations obtained during the field phase, were included. For the above, the manual developed by the Zoological Society of London was taken as a guide (Zrust, y otros, 2013) for designing the monitoring strategies for the threats identified in High Conservation Values areas. The threats identified for each of the HCVs considered are presented in the *Table 29.*

Table 29. Threat assessment.

HCV	Brief description of the HCV present	Main threats
HCV 1 – SPECIES BIODIVERSITY	HCV 1 is identified as dense forest, fragmented forest, secondary vegetation and gallery and riparian forest. In Magdalena MU, 9 RAP species were recorded in the gallery and riparian forest, while in Mercedes MU 13 RAP species were registered inside the dense forest. These coverages were considered as HCV 1 at a Management Unit level. The record of a troop of three specimens of a Black Saraguato (*Alouatta pigra*) stands out, currently threatened with a tendency to decrease its populations	*CURRENT:* • Hunting and / or capture of RTE species by the surrounding communities for sporting or commercial purposes. • Forest degradation and loss of forest relicts identified around the MU. • Ecosystem and habitat fragmentation because of roads construction and by other external farmers, in areas surrounding the MU. • Small-scale collection of terrestrial plants by the surrounding communities, which increases the pressure on the relicts of present forests. • Natural forest fires, accidental or provoked. • Low understanding of the surrounding communities about the importance of the identified HCV areas. • Expansion of the agricultural frontier in natural areas (jungle) leading to the loss and / or displacement of fauna to other areas. *POTENCIAL:* • Low understanding of the company's staff about the importance of protected areas and / or priority areas that are located in or near the areas evaluated. • Human settlements within the MU. • Little understanding of the staff about the value of protected wildlife. • Loss of fauna due to run over and / or poisoning. • Deforestation and loss of forest cover due to the clearing for the preparation and cleaning of the land in the new oil palm developments. • Fragmentation of natural coverage because of the opening for roads, tracks and / or irrigation or drainage lines. • Entry of unauthorized persons into the Management Units because of the opening of new roads and routes, facilitating and encouraging hunting inside these areas. • Extraction of wood for the infrastructure construction or domestic use. • Natural, accidental or provoked forest fires. • Operational threats as a result of the erroneous development of activities within the plantations by workers
HCV 3 – ECOSYSTEMS AND HABITATS.	HCV 3 was considered the ecosystem including evergreen and semi-evergreen forests of broadleaf forests, which is part of the great very humid and humid tropical forest ecosystems. It has been found that is currently in Critical Hazard. This HCV covers 39,74 ha within the Management Units.	*CURRENT:* • Timber extraction for domestic use. • Low understanding of the surrounding communities about the importance of the identified HCV areas. • Expansion of the agricultural frontier. • Fragmentation of forest areas due to clearing for the planting of pastures or crops and the construction of roads. *POTENTIAL:* • Expansion of the agricultural frontier in natural areas (forested) leading to the deforestation of them.

HCV	Brief description of the HCV present	Main threats
		• Human settlements within the MU. • Affectation of the functionality of the natural ecological system due to the introduction of a new crop in the MU. • Low understanding of the company's personnel about the importance of the identified HCV areas. • Expansion of invasive species (cover crops). • Natural forest fires, accidental or provoked. • Operational threats as a result of the erroneous development of activities within the plantations by workers • Entry of unauthorized persons into the Management Units because of the opening of new roads and routes, facilitating and encouraging hunting inside these areas. • Deforestation and loss of forest cover due to the clearing for the preparation and cleaning of the land in the new oil palm developments. • Fragmentation of forest areas due to clearing for the planting of pastures or crops and the construction of roads.
HCV 4 – ECOSYSTEM SERVICES.	Water protection, steep slope and slope stabilization round areas were defined as HCV 4 because they offer ecosystem support and regulation services.	*CURRENT:* • Absence of riparian coverage in some riparian zones. • Firewood exploitation by local communities. • Low understanding of surrounding communities about the importance of identified HCV areas. • Conversion of riparian areas to areas of agricultural use. • Erosion risk increased on the slopes of water bodies. *POTENCIAL:* • Logging for domestic use. • Contamination of water sources by agrochemicals and / or fertilizers. • Human settlements within the MU. • Contamination of water sources by the incorporation of solid waste into water bodies. • Conflicts regarding access to water resources. • A scarcity of the natural water resource and in the water channels and drainages "Quíneles". • Low understanding of the company's personnel about the importance of the identified HCV areas. • Operational threats because of the erroneous development of activities within the plantations by workers. • Entry of unauthorized persons into the Management Units because of the opening of new roads and routes, facilitating and encouraging hunting inside these areas. • Expansion of invasive species (cover crops). • Deforestation and loss of forest cover due to the clearing for the preparation and cleaning

HCV	Brief description of the HCV present	Main threats
		of the land in the new oil palm developments. • Occupation of the river beds due to the construction and opening of new roads and tracks. • Natural forest fires, accidental or provoked.
HCV 5 – COMMUNITY NEEDS.	HCV 5 was considered as the presence of natural sources of water from Arroyo 1 located at Mercedes MU. It supplies for the use id domestic activities by the population of the Village of San Francisco de las Mercedes 2.	*CURRENT:* • Use of resources associated with water sources and/or forest covers (harvesting of fruits, fishing, hunting and firewood for cooking food). • Expansion of the agricultural frontier in natural areas • Erosion risk increased on the slopes of water bodies. • Establishment of trails or paths. *POTENCIAL:* • Contamination of water sources by agrochemicals and / or fertilizers. • Contamination of water sources by the incorporation of solid waste into water bodies. • Conflicts regarding access to water resources. • Entry of unauthorized persons into the Management Units because of the opening of new roads and routes, facilitating and encouraging hunting inside these areas. • Expansion of invasive species (cover crops). • Deforestation and loss of forest cover due to the clearing for the preparation and cleaning of the land in the new oil palm developments. • Occupation of the river beds due to the construction and opening of new roads and tracks. • Natural forest fires, accidental or provoked.

3.3.10.2 *HCV Management and Monitoring Recommendations*

In order to guarantee maintenance of the identified HCVs, a series of requirements based on the RSPO's good management practices manual for the management and restoration of riparian reserves (RSPO, 2017). Before starting land preparation, planting and any other activities related to the project, the results of this HCV study as well as the management recommendations are consulted with the AOII communities. This is developed in order to know their opinions, agreements or disagreements about the designations and the management measures to be able to include their perceptions, avoiding affecting their rights.

Because of the evaluation process of the Management Units, HCV 1 and HCV 3 areas were identified due to the forest cover with the capacity to house significant concentrations of biological diversity. Mainly RAP species were found as well as vegetation belonging to the evergreen forest ecosystem and semi-evergreen broadleaf (large tropical forest ecosystem), which is currently threatened at the national level. The management of these areas, a 20-meter natural coverage buffer strip was defined, using the Bentrup (2008) guidelines, regarding buffer zones in biodiversity conservation processes. Its main objective is to protect the biological diversity concentrations and characteristic of these areas, by favoring the flows of matter and energy with the surrounding natural areas. In the AOII of Magdalena MU, the Sierra de Chinajá protected area and the IBA-KBA Candelaria-Kampur were considered HCV 1 and HCV 3 and, by taking into account the proximity of this Management Unit to the protected and priority area and to the interior from Magdalena MU; the same 20-meter buffer zone is proposed in order to protect these High Conservation Values in relation to the development of oil palm cultivation. The management of the HCV 1 and HCV 3 areas should be aimed at the recovery of the vegetation to facilitate and facilitate the connectivity between them and the surrounding coverages.

For areas considered HCV 4 the proposed management corresponds to delimitation of a water protection round of 10 meters long, which will include the lagoons existing in the Management Units, as well as for water bodies between 5 and 10 meters wide. For the birth of natural sources of water, corresponds to a 50-meter water protection round, associated with a differential management strip of an additional 10 meters. In this case a transition area is generated between the first palm line and the beginning of the water protection buffer. The round protection and management should be aimed at conserving forest cover areas that are within them, and to initiate a process of reforestation with native species in areas where the coverage is associated with pastures and shrubs in order to guarantee the provision of ecosystem services associated with the water bodies identified in the Mus.

The areas considered as HCV 5 require the establishment of participatory strategies with the surrounding communities. Commitments are to be generated regarding the use of the resource within the MU, the preservation of species of fauna and flora (no logging, no fishing nor hunting) and mechanisms of threats mitigation (reforestation, conservation of forest cover) are to be forced. The agreement must be representative of the communities and endorsed by institutional organizations such as The INAB and the Secretary of Environment and Natural Resources. In addition, as expressed in HCV 4, it is necessary to establish a 50-meter protection round around the water source of Arroyo 1 since it represents an indispensable source of supply for the surrounding communities.

Regarding HCV 6, although it is absent in the MU, whithin the area of indirect influence of Magdalena MU, different sites of cultural and traditional importance were identified, which makes it necessary to take important measures concerning the presence of fortuitous findings in the area during the project implementation (construction of drains, roads, etc.). The socio-cultural structure of the Q´eqchi´ communities involves direct contact with nature as part of their worldview, so there is presence of vestiges of the Mayan culture, customary rights and / or traditional rights in the MU.

In areas recommended for the management of showing High Conservation Values, cultural management focused on the reduction and / or non-use of agrochemicals (which can be replaced by organic products) is recommended. This is considered to ensure health and welfare of al the different species of flora and fauna identified, including natural resources and ecosystem services that they offer to the environment. The above must be closely related to the implementation of good agricultural practices (GAP) aimed at

promot human health, environment conservation and natural resources and the use and use of them in a sustainable manner. The running of each one of the management units must be consistent with the characteristics of the area and the presence or absence of High Conservation Values.

The totalization of the AMHCV corresponds to the sum of all the management areas. Some areas shows overlapping of several management areas, therefore, the net area is 94,25 ha.

Management and monitoring recommendations for High Conservation Values identified within the Management Units are summarized in *Table 30.* Finally, *Figure 23* and *Figure 24* shows the summary map of management areas for each MU.

Table 30. HCV Management Areas (HCVMA) in the Management Units.

Management Unit	HCVMA	Management	Area (ha)
MAGDALENA	HCVMA 1 and 3	Forests (HCV 1) and evergreen and semi-evergreen broadleaved forest (HCV 3)	12,96
	HCVMA 1 and 3	Cushioning band for forest protection (20 m)	12,47
	HCVMA 4	Riparian buffer zone (10 m)	22,17
	HCVMA 4	Differentiated management area (10 m)	21,46
TOTAL HCVMA MAGDALENA MU			*72,06*
MERCEDES	HCVMA 1 and 3	Forests (HCV 1) and evergreen and semi-evergreen broadleaved forest (HCV 3)	26,78
	HCVMA 1 and 3	Cushioning band for forest protection (20 m)	1,87
	HCVMA 4	Riparian buffer zone (10 m and 50 m)	1,11
	HCVMA 4	Differentiated management area (10 m)	0,63
	HCVMA 5	Riparian buffer zone (50 m)	0,68
TOTAL HCVMA MERCEDES MU			*31,07*
TOTAL HCVMA			*94,25*
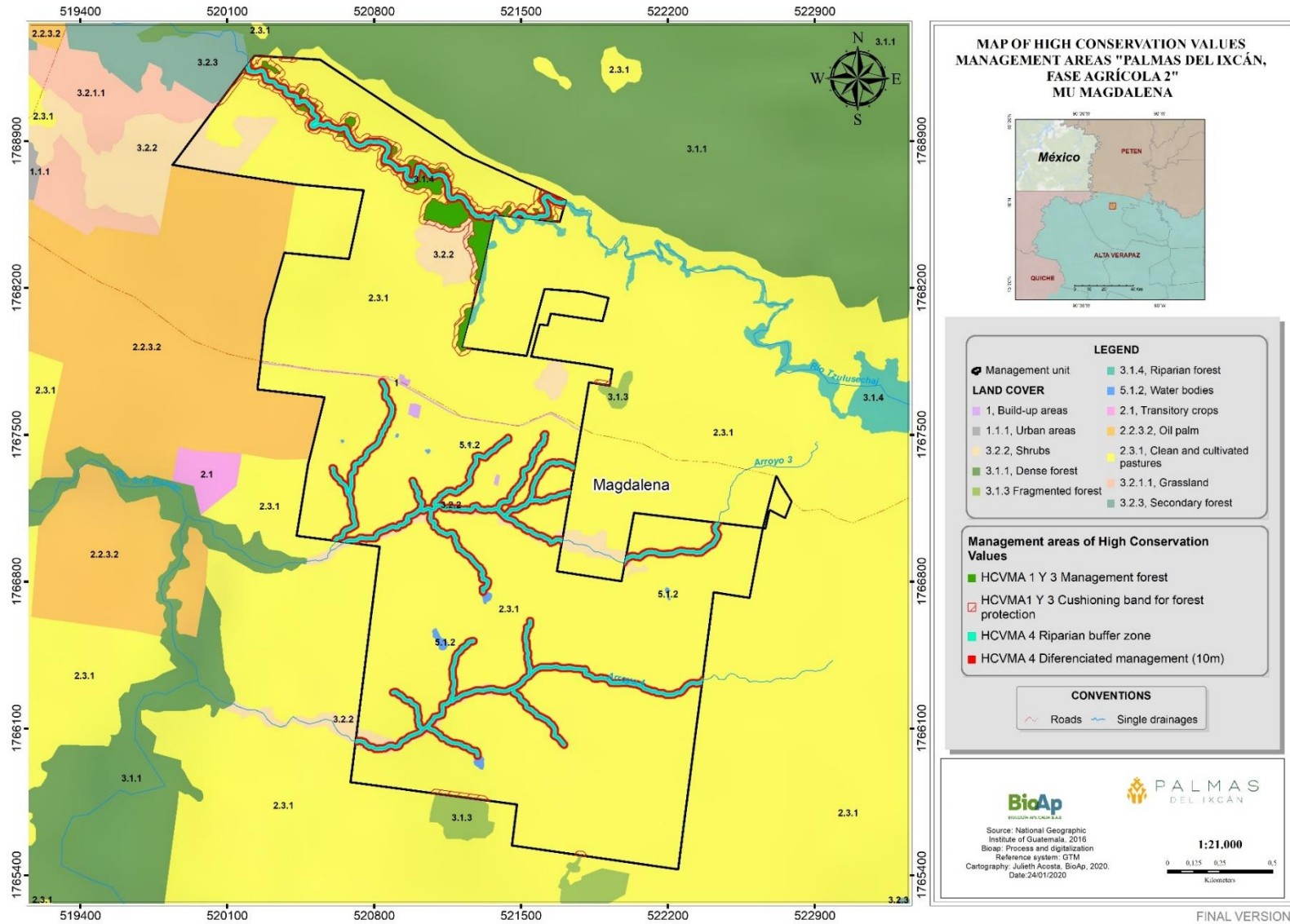
Figure 23. HCV Management areas (HCVMA), Magdalena MU.
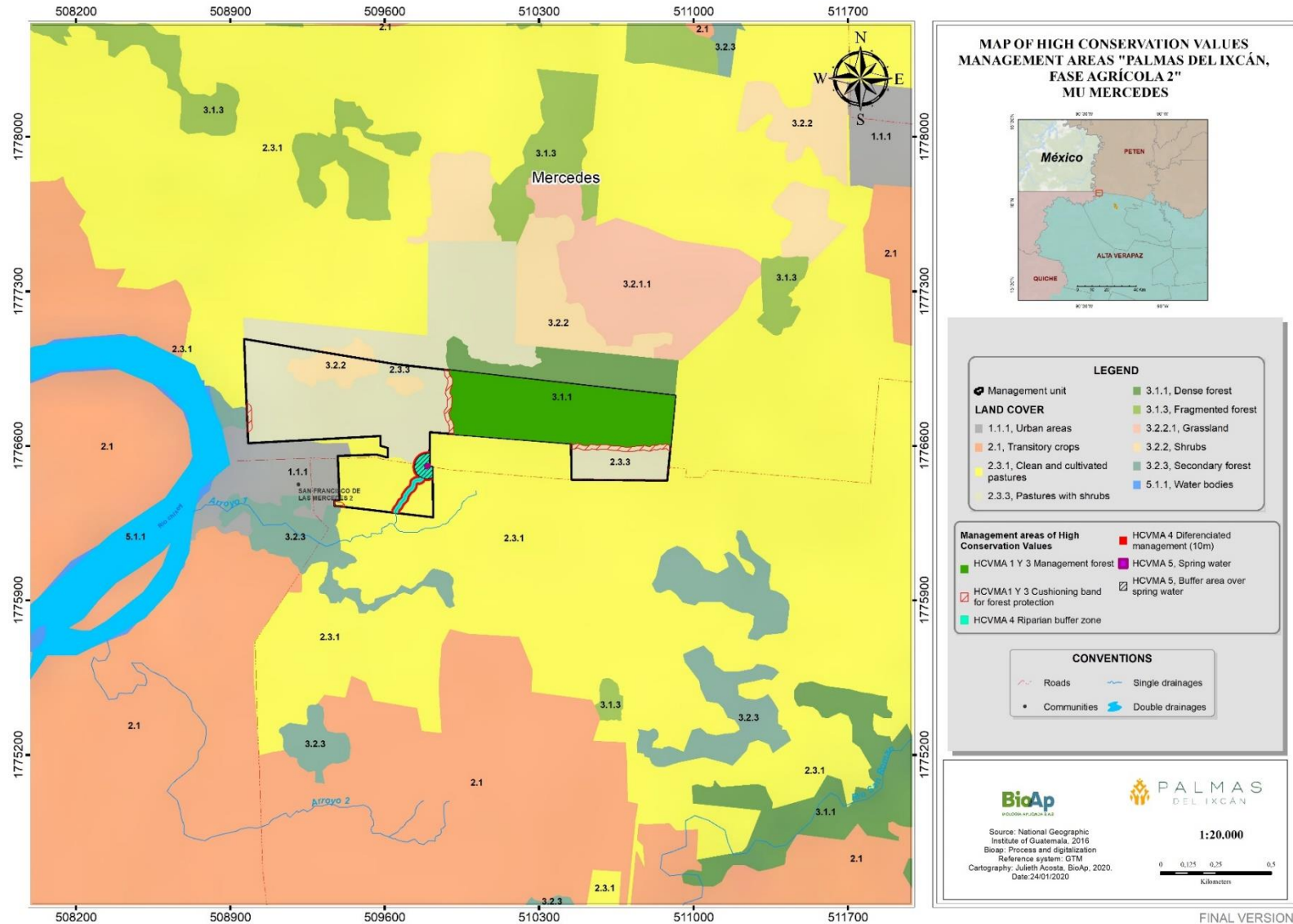
Figure 24. HCV Management areas (HCVMA), Mercedes MU.

3.4 Free, Prior and Informed Consent (FPIC)
3.4.1 Regulatory standard

- *Constitution of the Republic of Guatemala:*

Article 39: Private property. Article 39 indicates that Private Property is guaranteed as an inherent right of the human person. Everyone can freely dispose of their property in accordance with the law. The State guarantees the exercise of this right and must create the conditions that facilitate the owner the use and enjoyment of their goods in a way that will achieve individual progress and national development for the benefit of all Guatemalans.

Article 67: Protection of indigenous agricultural land and cooperatives Article 67 indicates the protection of indigenous agricultural lands and cooperatives or any other form of communal or collective possession of agrarian property, as well as the family patrimony shall enjoy special protection of the land. State as can be analyzed, in Guatemala private property is guaranteed and the owner can freely dispose of its use and enjoyment.

- *Decree Number 41-2005 Cadastral registration information law*

Titles IV, VI, VII, and VIII. The cadastral process and the institution responsible for promoting and developing it, in the context of the search for solutions to the agrarian problem and the establishment of solid foundations for the legal security of land tenure

3.4.2 Legality in land tenure

According to the Register of Cadastral Information and the Superintendence of Tax Administration (SAT), the units destined for new palm oil plantations by the company Palmas del Ixcán are located in the municipality of Chisec in the department of Alta Verapaz, where that the MU have the requirements that define the legality and tenancy of the land (*Table 31*), taking into account that this is conceived as private property and its exchange is governed by agreements between the parties, in which it is clarified that " on the real estate object of the contract, there are no taxes, annotations or limitations, as well as judicial, administrative and municipal matters that could harm the buyer and that, in any case, as a matter of law, it is obliged to be sanitized ".

Table 31. Registration of land acquisition, MU Magdalena and Mercedes.

Management Unit	Farm	Sheet number	Book	Hectares
Magdalena	925	425	82E A.V.	20,49
Magdalena	4656	156	70E A.V.	14,46
Magdalena	11015	34	45 T.A.	15,98
Magdalena	8495	495	257 E A.V	0,52
Magdalena	11008	27	45 T.A.	90,39
Magdalena	11007	26	45 T.A.	90,74
Magdalena	2054	54	105 E A.V.	20,48
Magdalena	6077	77	193 E A.V.	0,62
Magdalena	638	138	82E A.V.	42,11
Magdalena	426	426	81E A.V.	10,95
Magdalena	3873	373	88E A.V.	10,18
Magdalena	3874	374	88E A.V.	31,45
Magdalena	3875	375	88E A.V.	24,09
Magdalena	3876	376	88E A.V.	9,26
Magdalena	3059	59	307E A.V.	0,81
Magdalena	6501	1	214E A.V.	4,47
Magdalena	6523	23	94E A.V.	20,18
Magdalena	6524	24	94E A.V.	20,48
Magdalena	2072	72	305E A.V.	0,35
Magdalena	9321	321	79E A.V.	10,16

Management Unit	Farm	Sheet number	Book	Hectares
Magdalena	8131	131	77E A.V.	10,62
Magdalena	7326	326	75E A.V.	10,29
Magdalena	264	264	81E A.V.	11,05
Magdalena	3334	334	87E AV	8,74
Mercedes	1042	71	57	10,33
Mercedes	1042	71	57	60,48
Mercedes	1812	312	204E	10,28

Source: (Palmas del Ixcán, 2018)**.**

On the other hand, during the approach to the surrounding communities there was no type of claim or disagreement on the part of the acquisition of land, on the contrary, it is affirmed that the sale of the same was given voluntarily by the owners what I do not mean any type of forced displacement by the company Palmas del Ixcán.

3.4.3 Identification of actors and their representativeness

From the scoping stage, as well as the revision of secondary sources, the different social actors that are close to the MUs and / or that carry out some type of activities with the communities of the area are identified. Based on the identification, a weighting and prioritization of the social actors is carried out through the methodology for the identification and analysis of interested parties. This identification and weighting included the following criteria: proximity of the communities to the project site, access roads involved, resources of possible affectation, and interest of the communities on the new plantations.

3.4.3.1 Participatory mapping

Participatory mapping was the Methodology used to do FPIC, to determine the scope of the communities.

- The main proposals incorporated in the plans:
- Protect the water sources that are inside the MU Magdalena, through reforestation and non-application of agrochemicals nearby.
- Regulation of vehicle traffic to avoid accidents and maintenance of roads.
- Free access to neighboring plots that require movement within the crop towards their MU. Labor inclusion to personnel from the area of influence
- Active communication with the members of the COCODES.
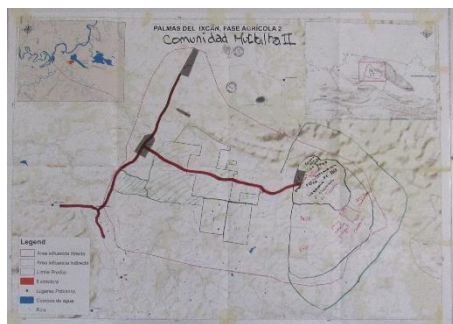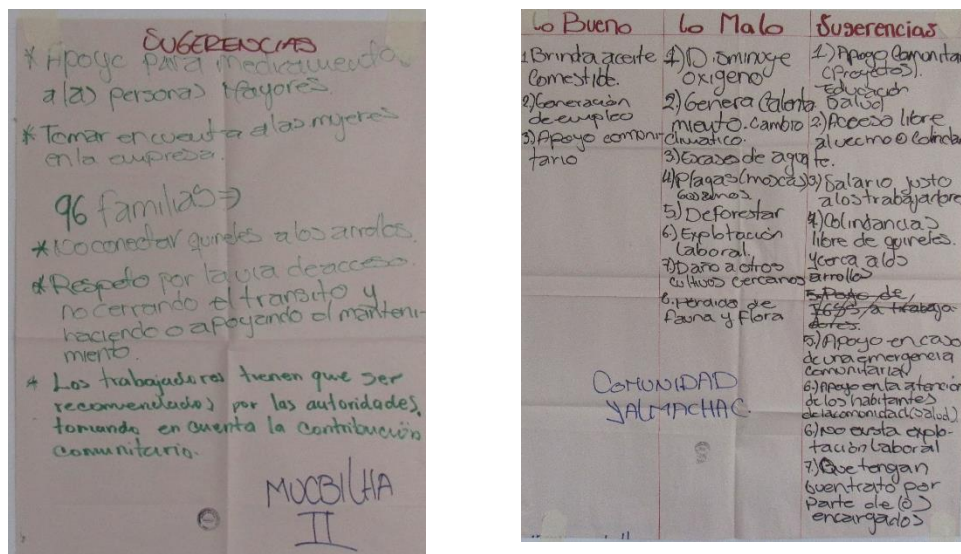
Figure 25. Participatory mapping of social actors.

In addition, participatory mapping developed tools such as the semi-structured interview that facilitated the capture of information by communities and other social actors.

3.4.3.2 *Preparation, Reading and signing of the minutes*

In accordance with the consultation process developed with the communities, the authorities of the communities prepared an act in their respective minute books of the communities, it was read and all agreed, the minutes were signed. Among the main comments found in the minutes are the following:

Community	Action agreement
YALMACHAC	The plots where it will be planted are private property; it is not a communal area. The community agrees to plant because it is source of employment.
MUCBILHA II	The community authorities explain to the participants that they agree to start with the palm oil planting work by the company Palmas del Ixcán, which they affirmed with a YES.
SAN FRANCISCO DE LAS MERCEDES	The people of the community agree that the company Palmas del Ixcán sow palm oil. So the village is committed to respect the company's rules and request to work according to law.
MERCEDES I	The community agrees because it will be an employment opportunity.

In general terms, all the communities mentioned above agree that Palmas del Ixcán Limitada will carry out the planned plantings on the company's land, considering that they are private lands and, according to the law, they have the right to plant them, within the area to be planted there are no established communities, so we can conclude that the study of Free Prior Informed Consent for new sowing of Palmas del Ixcán, according to the FPIC Flow Diagram of the Guide on Free, Prior and Informed Consent for RSPO members, Nov. 2015, it is not necessary to carry out the FPIC, however, the consultations were made in order to comply with the New Plantations Process.

3.5 Land Use Change Analysis (LUCA)

Table 32 shows the land cover identified in the areas evaluated; likewise, *Table 33* shows the plant coverings per MU for each RSPO period.

Table 32. Land cover.

Land covers	RSPO period/area (ha)				
	2005	2007	2009	2014	2018
Dense forest	26,78	26,78	26,78	26,78	26,78
Pastures	448,67	458,27	461,15	462,85	487,41
Secondary forest	25,02	25,02	22,15	22,15	12,96
Settlements and build-up areas	1,65	1,65	1,65	1,65	1,65
Shrubland	56,75	47,14	47,14	45,44	30,09
Water bodies	1,09	1,09	1,09	1,09	1,08

Table 33. Land cover for each period.

Land cover	RSPO period/area (ha)				
	2005	2007	2009	2014	2018
MAGDALENA					
Pastures	409,58	409,58	412,45	412,69	438,63
Secondary forest	25,02	25,02	22,15	22,15	12,96
Settlements and build-up areas	1,65	1,65	1,65	1,65	1,65
Shrubland	41,52	41,52	41,52	41,28	24,55
Water bodies	1,09	1,09	1,09	1,09	1,08
MERCEDES					
Dense forest	26,78	26,78	26,78	26,78	26,78
Pastures	46,24	46,24	46,24	47,70	48,78
Shrubland	8,08	8,08	8,08	6,61	5,54

3.5.1 Land cover in Management Units by cut off period
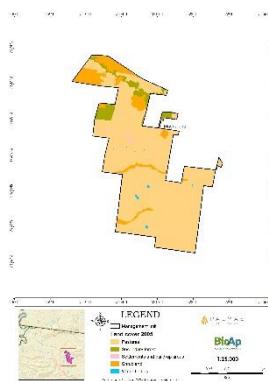
Cobertura, año 2005   Cobertura, año 2007   Cobertura, año 2009
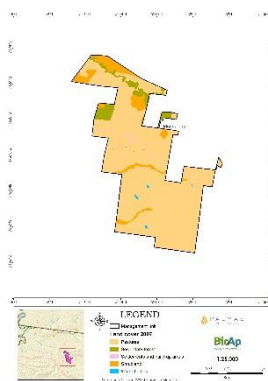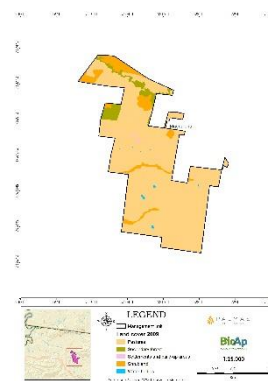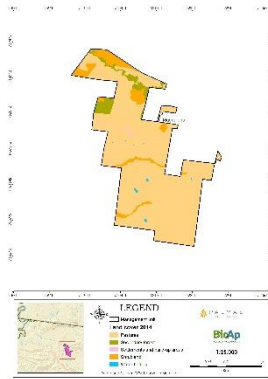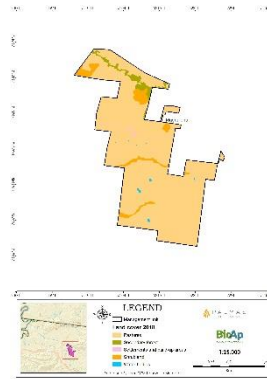
Cobertura, año 2014

Cobertura, año 2018

Figure 26. Land cover for each cut off period, Magdalena MU.
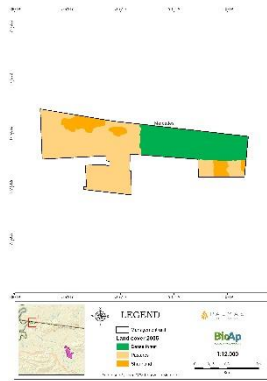
Cobertura, año 2005
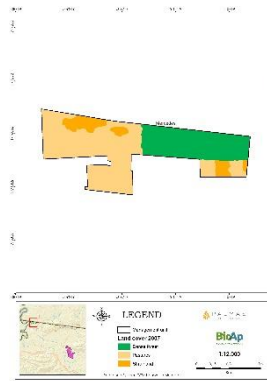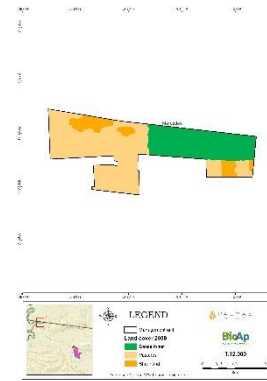
Cobertura, año 2007
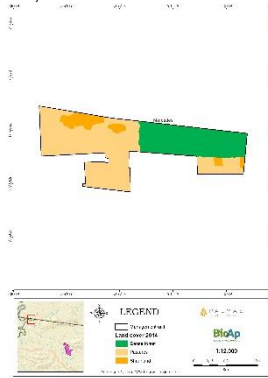
Cobertura, año 2009
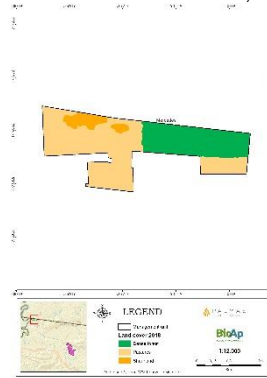
Cobertura, año 2014

Cobertura, año 2018

Figure 27. Land cover for each cut off period, Mercedes MU.

3.5.2   Satellite images by cut off period

2005

2007

2009

2014

2019
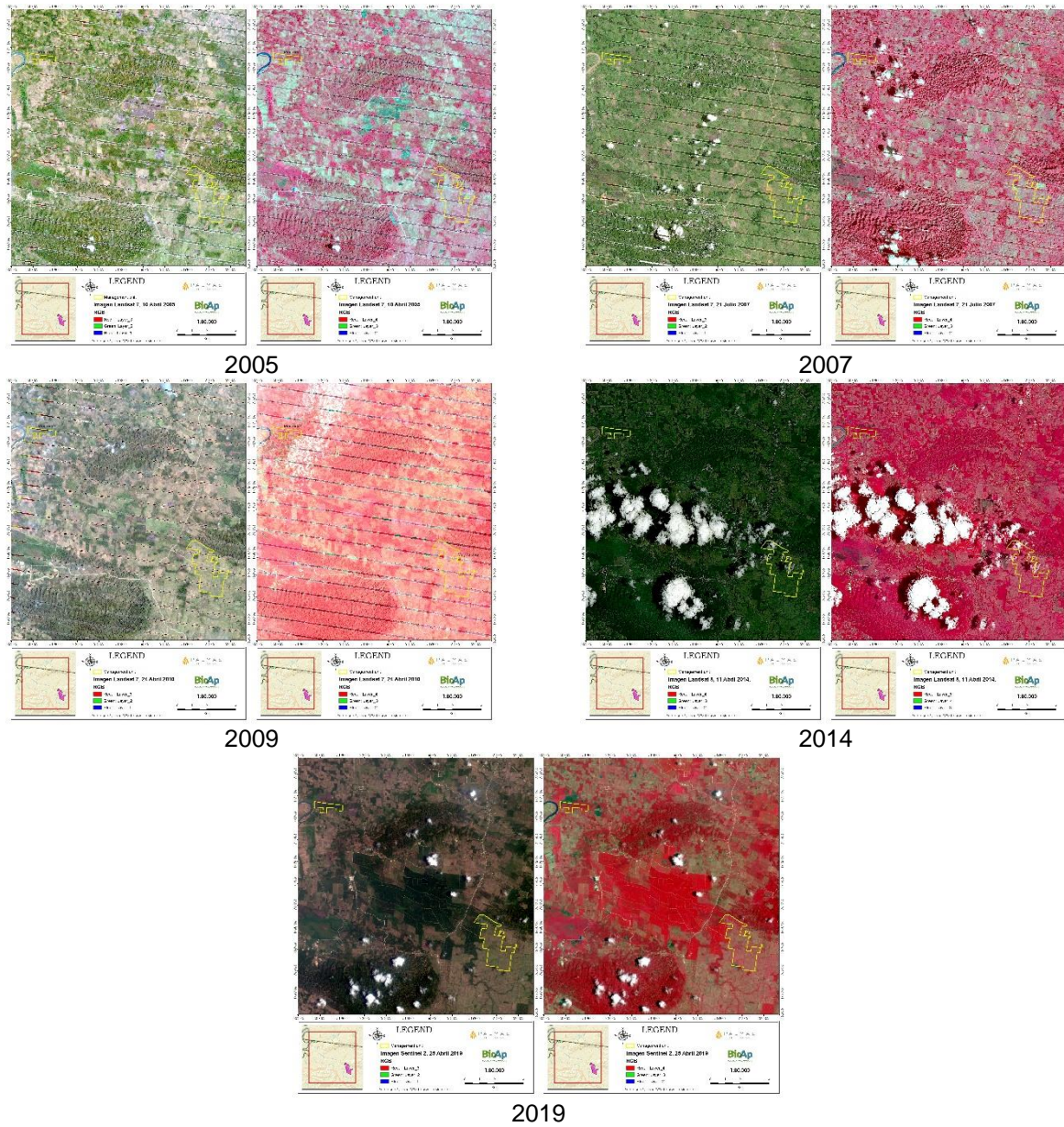
Figure 28. Satellite images used for each cut off period in MU.

3.5.3 Change of RSPO coefficient coverage in Management Units

RSPO coefficients 2005   **RSPO coefficients 2007**   **RSPO coefficients 2009**

RSPO coefficients 2014   **RSPO coefficients 2018**
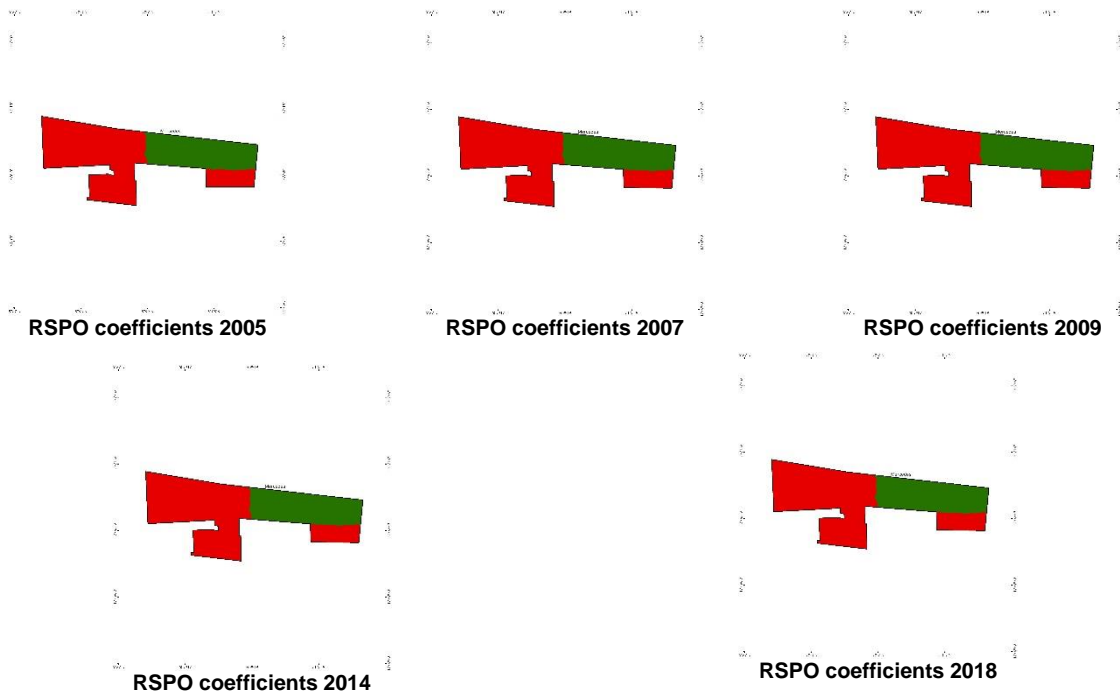
Figure 29. Change RSPO coefficients, Mercedes MU.

RSPO coefficients 2005   **RSPO coefficients 2007**   **RSPO coefficients 2009**

RSPO coefficients 2014   **RSPO coefficients 2018**
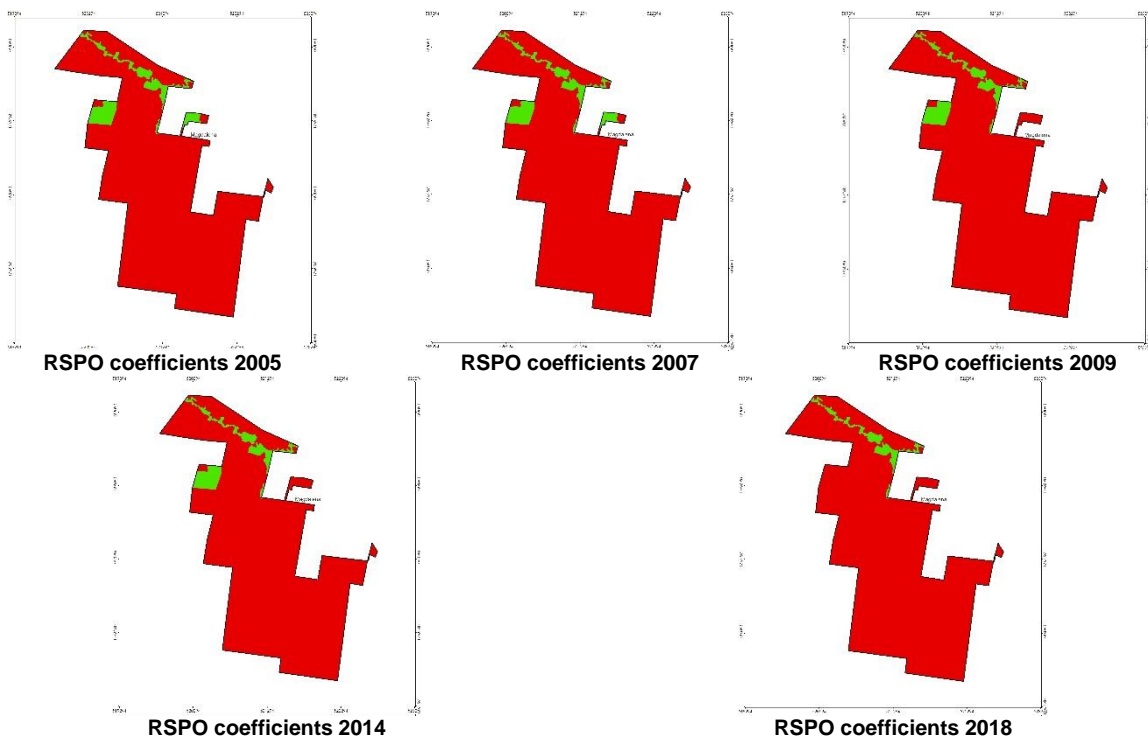
Figure 30. Change RSPO coefficients, Magdalena MU.

3.6   Fragile soils

Soil analysis for the Management Units allowed identifying the presence of two soil orders corresponding to Entisol and Ultisol.

In Magdalena Management Unit, the Ultisol unit (78,86 %) predominates with the presence of soils identified with the Ud-MU-Pd codes, which normally have a high alteration of their mineral materials, so most of these they are poor soils due to the washing they have suffered over time, which is why they tend to have low productivity, especially in nutrient demanding activities (MAGA, 2000). The remaining surface of this MU (21,14 %) has soils of the Entisol order (code Eo-Mr-Ud) characterized by not having any evidence of development of its profile due to extreme conditions such as relief or excess Water.

In Magdalena MU 59,33 % of the land has a gentle slope characterized by having inclinations between 0 and 5 °, 34,36 % presents a moderate slope with inclinations between 5 and 10 °, 5,45 % presents a strong slope with inclinations between 10 and 15 °, the 0,71 % slope quite strong with inclinations between 15 and 25 ° and the 0,15 % very strong slope with slopes greater than 25 ° (*Figure 31*).
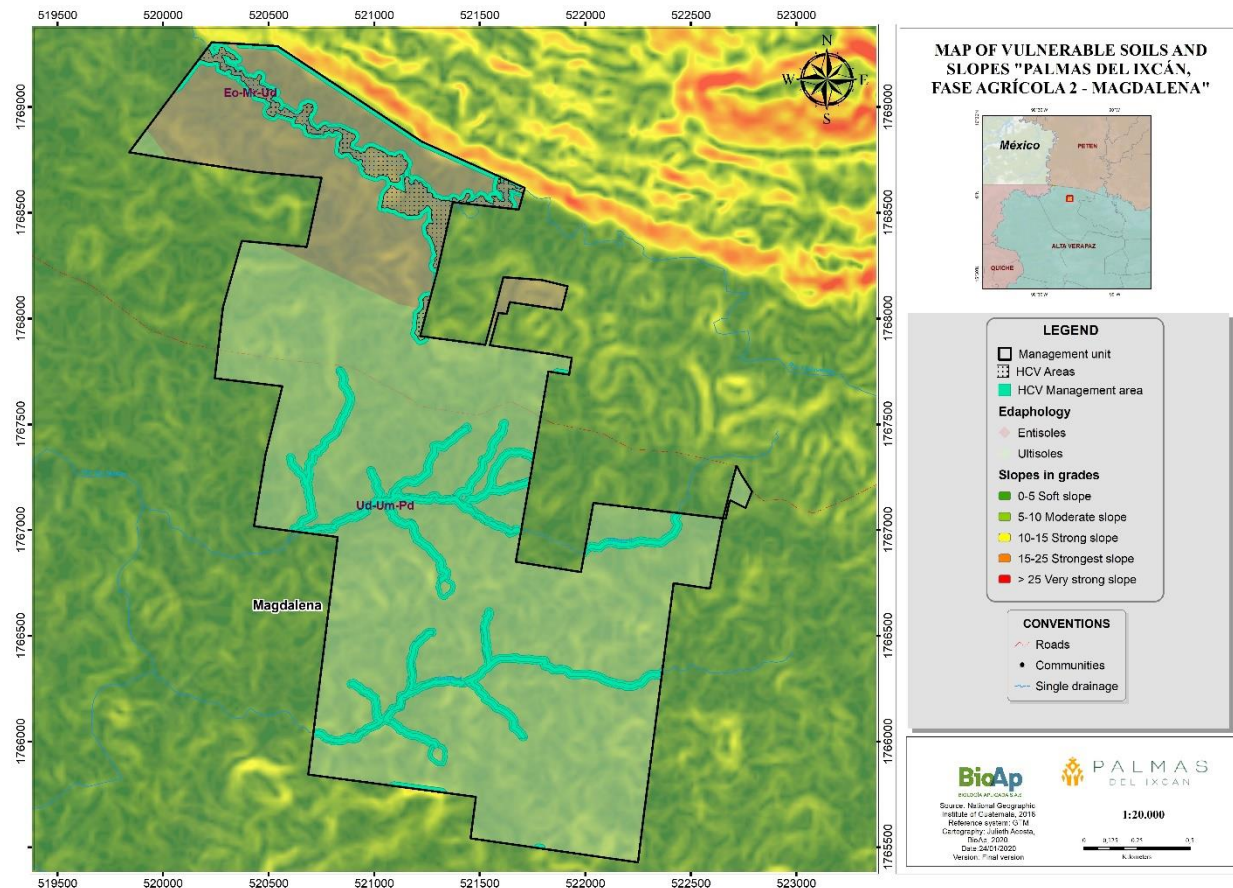
Figure 31. Map of vulnerable soils, Magdalena MU.

Similarly, in Mercedes Management Unit, 100 % of its surface has floors belonging to the order Ultisol with the presence of soils with Ud-MU-Pd codes. Likewise, 75,66 % of the territory has a gentle slope characterized by having inclinations between 0 and 5 °, 22,57 % presents a moderate slope with inclinations between 5 and 10 °, the 1,69 % has a slope Strong with inclinations between 10 and 15 ° and 0,08 % has quite steep slope with inclinations between 15 and 25 ° (*Figure 32*).
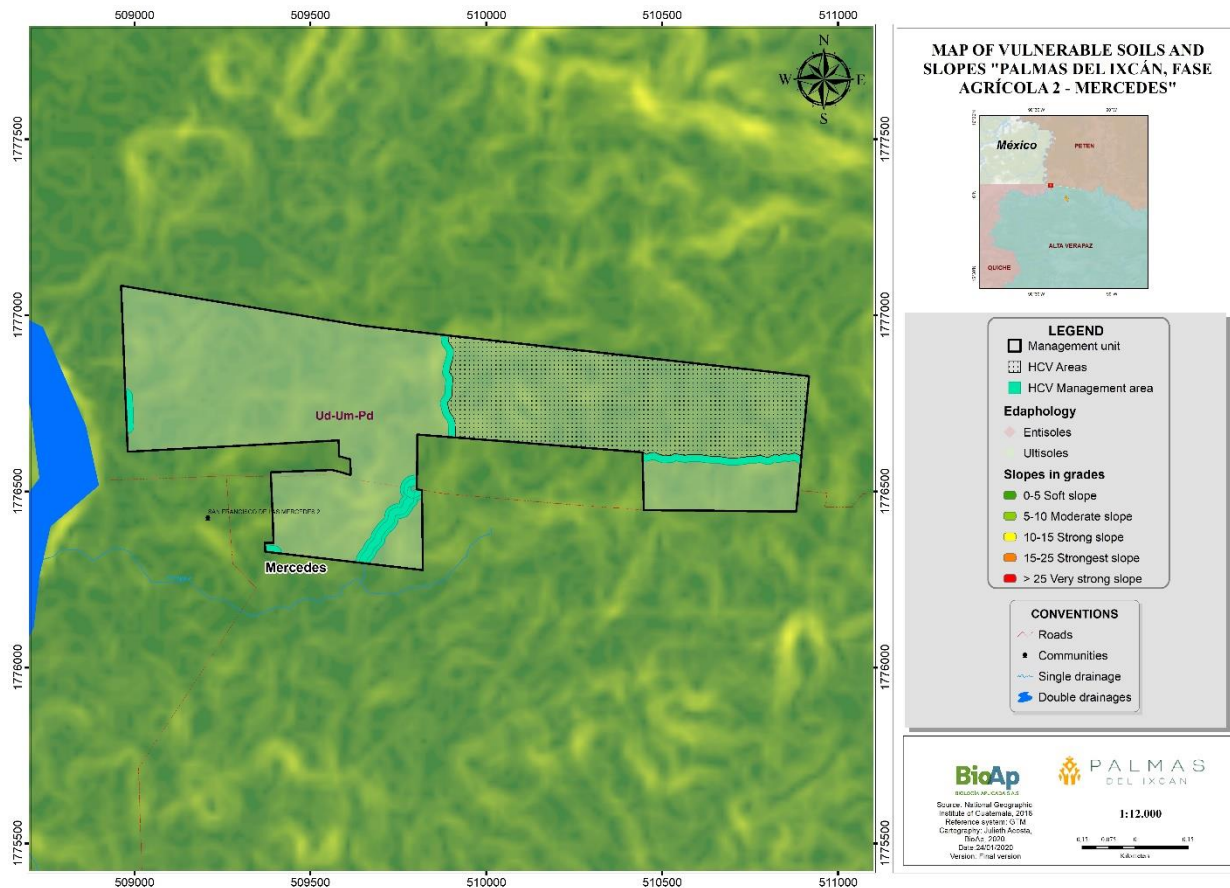
Figure 32. Map of vulnerable soils, Mercedes MU.

According to the Principles and Criteria for the Production of Sustainable Palm Oil (Roundtable on Sustainable Palm Oil, 2018), it is indicated in Criteria 7.5, 7.6 and 7.7 that new oil palm plantations should not be carried out on steep slopes, on marginal and fragile soils or on peat soils regardless of their depth. Annex 1 of this document indicates the following definitions:

- Fragile soil: A soil that is susceptible to degradation (reduction in fertility) when disturbed. A soil is particularly fragile if the degradation rapidly leads to an unacceptably low level of fertility or if it is irreversible using economically feasible management inputs.
- Marginal soil: A soil that is unlikely to produce acceptable economic returns for the proposed crop at reasonable projections of crop value and costs of amelioration. Degraded soils are not marginal soils if their amelioration and resulting productivity is cost effective.
- Steep terrain: Areas above 25 degrees or based on a National Interpretation (NI) process.

In this way and taking into account the identification and edaphic description for each of the study UM, no soil units that can be classified as marginal or fragile, peat soils or areas with steep slopes (> 25 °) are identified; however, in areas with a strong slope, quite strong and very strong (> 10 °), the necessary measures must be taken to ensure the preservation of the soil and prevent its erosion, taking into account the previously mentioned orientations and definitions within the framework of the RSPO.

3.7   High Carbon Reserves and Greenhouse Gases (GHG)
3.8   Carbon stock estimation with RSPO

The tons of carbon (tC) were quantified according to the type of coverage, *Table 34* shows the results of the carbon fixation for the area evaluated, and each of the coverages present in the two evaluated MUs will be described, where the type of coverage presented within the MU and its area will be taken into account, in order to determine the total of tC, the following equation is made:

$$tC = tC/ha * Area\ (ha)$$

Table 34. Estimation of the carbon stock in AGB and BGB of the evaluated area.

Land cover	Area (ha)	tC/ha	Total tC
Intact forest	26,78	268	7.177,04
Disturbed forest	12,96	128	1.658,88
Shrubs	30.09	46	1.384,14
Pastures	487,41	5	2.437,05
Water body	1,08	0	0
Build up areas	1,65	0	0
GRAND TOTAL			*12.657,11*

It should be noted that the vegetation cover of the two MUs was calculated the value of carbon fixation according to their structural characteristics, floristic diversity and anthropogenic disturbances. These results lead to a zoning of the areas for conservation taking into account the values of carbon fixation and the service that the ecosystem provides as a carbon deposit (RSPO, 2016).

Table 35. Estimation of the carbon stock in AGB and BGB of MU Magdalena.

MU	Land cover	Area (ha)	tC/ha	Total tC
MAGDALENA	Disturbed forest	12,96	128	1658,88
	Shrubs	24,55	46	1129,3
	Pastures	438,6	5	2193,15
	Water body	1,08	0	0
	Build up areas	1,65	0	0
	TOTAL MAGDALENA MU			*4.981,33*

Table 36. Estimation of the carbon stock in AGB and BGB of the Mercedes MU.

MU	Land cover	Area (ha)	tC/ha	Total tC
MERCEDES	Intact forest	26,78	268	7.177,04
	Shrubs	5,54	46	254,84
	Pastures	48,78	5	243,90
	TOTAL MERCEDES			*7.675,78*
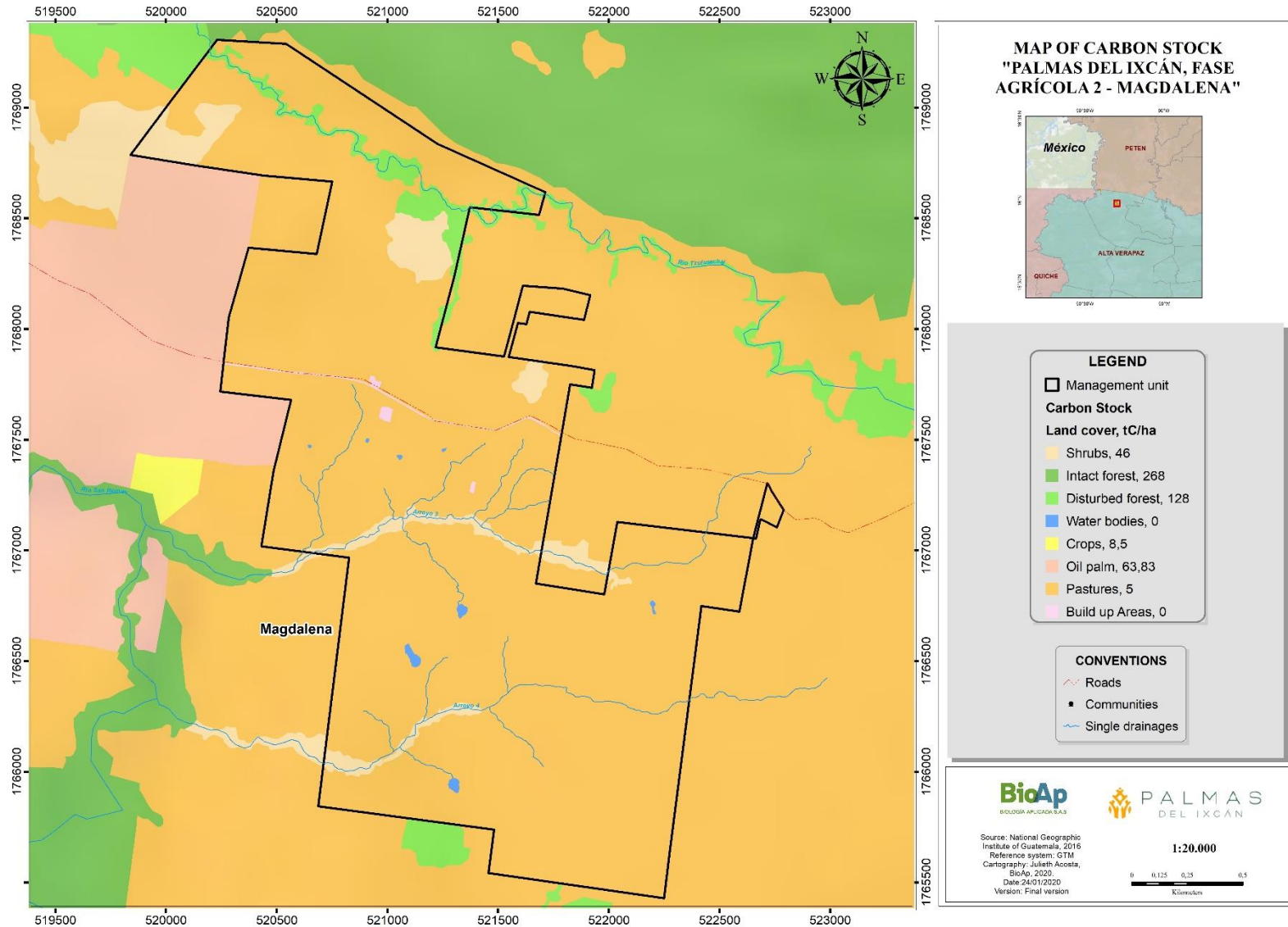
Figure 33. Carbon stock, MU Magdalena
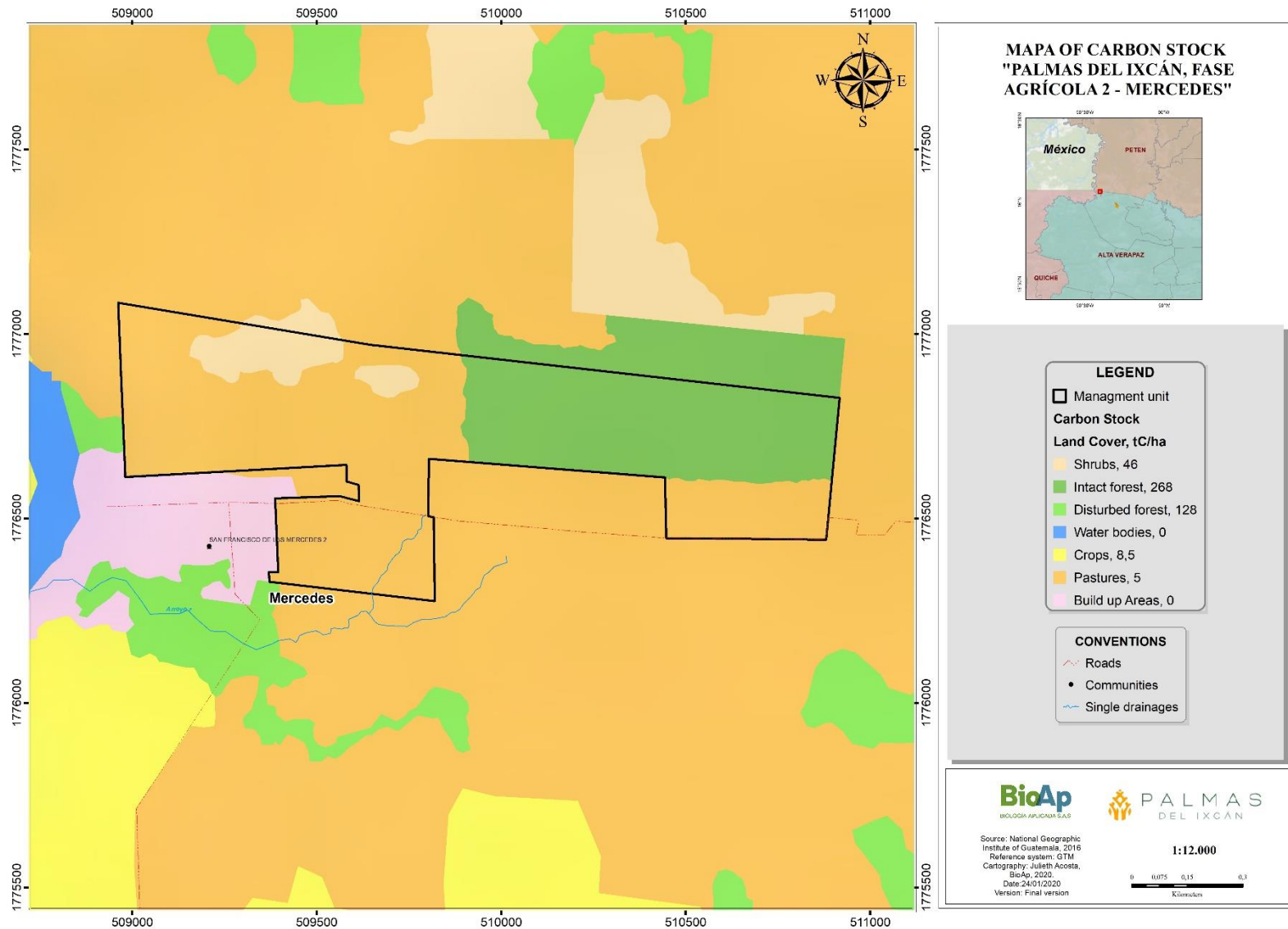
Figure 34. Carbon stock, MU Mercedes.

3.8.1 Estimation of GHG reserves with GHG calculator for new plantations

According to the results obtained from the carbon stock and the analysis of the greenhouse gas (GHG) calculator, four scenarios are defined, which are presented in *Table 37.*

Table 37. Scenarios Gases Greenhouse effect for new palm plantations.

Scenario	Description
Scenario 1	All potential areas (Pastures and shrubs) for new plantations cleared for palm oil, except all forest areas. All disturbed forests must be conserved, just as no clearings will be made in HCV areas and neither in management areas. There are no methane capture facilities planned for the Mill.
Scenario 2	Potential areas (pastures and shrubs) for new plantations cleared for palm oil, except all forest areas. All disturbed forests must be conserved, just as no clearings will be made in HCV areas and neither in management areas. There are methane capture facilities planned for the Mill.
Scenario 3	All potential areas (pastures) for new cleared plantations for palm oil, except all forest areas. All disturbed forests must be conserved, just as no clearings will be made in HCV areas and neither in management areas. There are no methane capture facilities planned for the Mill.
Scenario 4	Potential areas (pastures) for new plantations cleared for palm oil, except all forest areas. All disturbed forests must be conserved, just as no clearings will be made in HCV areas and neither in management areas. There are methane capture facilities planned for the Mill.

It is important to mention that the areas presented below are the areas that were considered potential to carry out the new plantings. It should be noted that some areas of cover such as grasslands and shrubs were taken as management areas, and were not added as potential areas to the same as the areas identified as HCV since in these no agricultural practice can be carried out.

Table 38. Description of the 4 scenarios to evaluate.

		S1	S2	S3	S4
Area avoided for development (ha)	HCV area	63,04	63,04	63,04	63,04
Potential areas for new developments (ha)	Shrubs	22,42	22,42	-	-
	Pastures	438,85	438,85	438,85	438,85
POME treatment	Conventional treatment	Y	-	Y	-
	Methane capture	-	Y	-	Y

3.8.1.1 *Comparison of results of scenarios*

The results obtained in each of the 4 scenarios are presented in *Table 39* it should be mentioned that in the field activities for scenarios 1 and 3 it is established that the application of lesser quantity of fertilizers is done, this is done with the In order to carry out good practices in the field, however, in the case of scenarios 2 and 4, the application of the normal amount of fertilizers is carried out.

For the activities in the Mill methane uptake is done for scenarios 2 and 4, while in scenarios 1 and 3 it is carried out in a conventional manner, however, as mentioned above, the company performs the composting activity, therefore, the POME will be treated in these and thus the emissions will be reduced in a certain way.

Figure 35 shows the graph where the results of the four scenarios proposed for the new sowing areas.

Table 39. Projection of GHG emissions associated with the two scenarios proposed for development.

Activity	S 1	S 2	S 3	S 4
	tCO2e	tCO2e	tCO2e	tCO2e
Clearance from the ground	268,80	268,72	182,85	87,77
Crop capture	-4.318,29	-4.318,10	-4.108,40	-4.108,40
Fertilizers	355,40	603,91	338,13	574,59

N2O	2.321,43	2.441,02	2.102,39	2.322,48
Field fuel	2,78	2,78	2,50	2,50
Peat	0,00	0,00	0,00	0,00
Conservation Credit	-94,56	-94,56	-94,56	-94,56
Total	-1.464,44	-1.096,22	-1.577,08	-1.215,62
Mill emissions and credit	**tCO2e**	**tCO2e**	**tCO2e**	**tCO2e**
POME	2,94	0,55	2,94	0,55
Mill fuel	1,06	1,06	1,06	1,06
Acquired electricity	0,90	0,90	0,90	0,90
Credit (excess of exported electricity)	0,00	0,00	0,00	0,00
Credit (sale of biomass for energy)	0,00	0,00	0,00	0,00
Total	4,90	2,51	4,90	2,51
Total emissions, tCO2e (field and Mill)	**-1.460**	**-1.094**	**-1.572**	**-1.213**
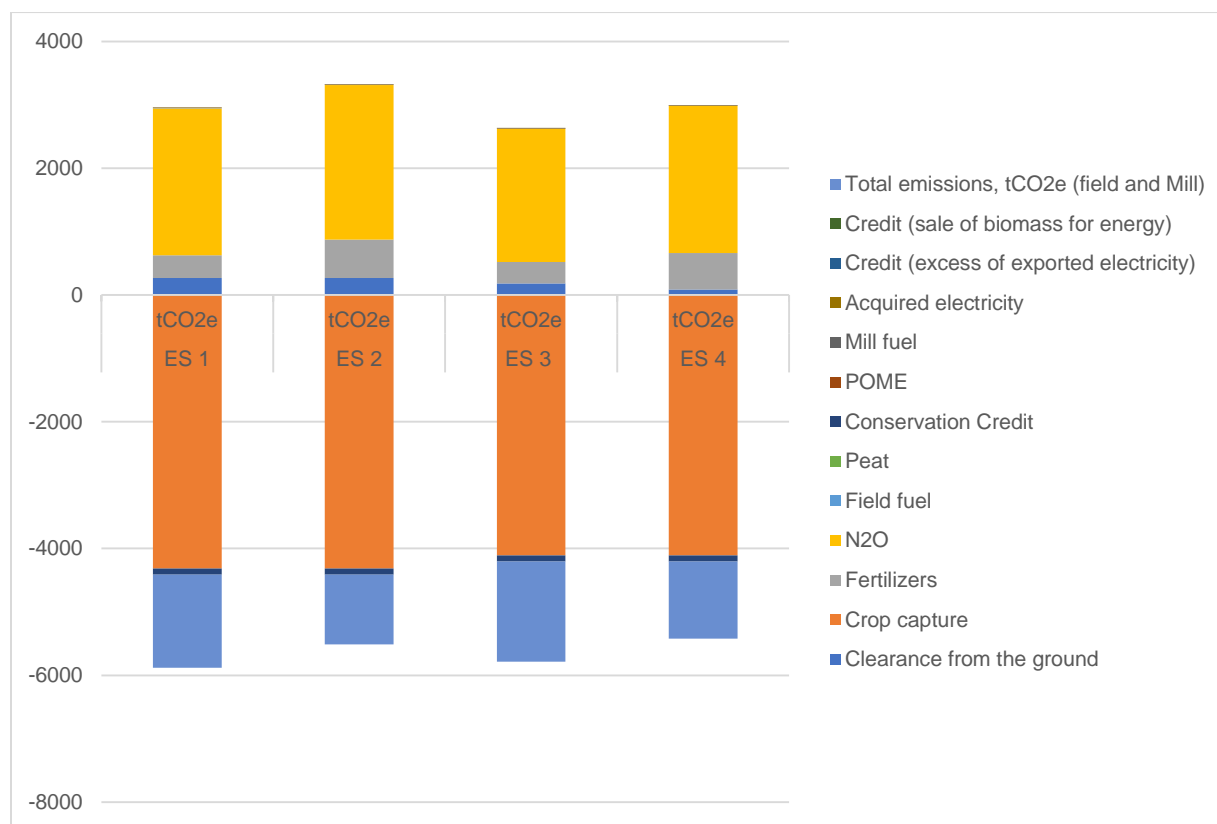
Figure 35. Projection of GHG emissions (tCO2).

Based on the results obtained above, it is indicated that for Palmas del Ixcan, the scenario that best adapts to the conditions for the development of the new plantations of said company is scenario 1 with emissions of -1,460 tCO2, due to that this is better suited to the operational capacity of the company and the plant cover that are found in the evaluated properties. This is considered as conservation areas of intact and intervened forests, as well as other areas identified with HCV, also established as potential areas the vegetation cover of grasslands and shrubs.

The emissions that are generated by the activities carried out in the field are -1,464,44 tCO2, where it is evidenced that the activity that generates the highest emission occurs in the application of fertilizers and N2O emissions with emissions of 2,676,83 tCO2, where it is possible note that the emissions emitted by fertilizers is 355.40 tCO2 in which this activity not only evaluates the emissions generated at the time of application, but also takes into account from the moment the fertilizer leaves the production plant until The moment that is applied in the field and the N2O emissions is 2,321.43 tCO2, where the emissions generated in the application of both chemical and organic fertilizers that are taken to the field are evaluated, another of the sources of emissions is due to the activity of soil clearance with 268,80 tCO2.

As in the activities, emissions are generated, CO2 capture is also generated, in this case the main source of capture is given by the crop sequestration where emissions of -4,318,29 tCO2 are obtained, this allows to demonstrate that at the time of carrying out the project, when palm sowing is carried out, a greater carbon fixation will begin to be generated in the proposed areas, since the capture of palm is increased when the change of coverage mainly of grassland is made, therefore it is generated a favorable effect on the environment. It is also important to mention why do not opt for scenario 3, mainly because scenario 1 makes better use of the areas that are optimal for carrying out new plantations, while that in scenario 3 only the use of areas with grassland coverage would be used, generating a decrease in the total potential area, and wasting or the area of shrubs that were not identified as HCV or management areas.

In the case of the emissions generated by the mill, there are emissions of 4.90 tCO2, it is worth mentioning that in scenarios 1 and 3 the same emissions are obtained, because in both of them they carry out the treatment of EEAP in a conventional manner, However, as mentioned, what favors the company is the composting system, since this activity will allow emissions to be reduced due to EEAP being treated.

4   SUMMARY OF RESULTS

Main results of the studies carried out in Magdalena and Mercedes MUs of the company Palmas del Ixcán are reviewed. *Table 40* resumes the main results.

Table 40. Summary of results.

MU	Land cover	Land cover area (ha)	MU area (ha)	HCV area (ha)	HCVMA (ha)	Potential planting area (ha)	Potential planting area (%)	tC/ha	Total tC
MAGDALENA	Shrubs	24,55	478,87	35,13	72,06	16,88	3,52	46	1.129,3
	Riparian forest	12,96				0,00	0,00	128	1.658,88
	Water body	1,08				0,00	0,00	0	0
	Clean and cultivated pastures	438,63				393,22	82,11	5	2.193,15
	Build up areas	1,65				0,00	0,00	0	0
MERCEDES	Shrubs	5,54	81,09	27,91	31,07	5,54	6,83	46	254,84
	Dense forest	26,78				0,00	0,00	268	7.177,04
	Pastures with shrubs	38,40				36,50	45,01	5	192,00
	Clean and cultivated pastures	10,38				9,13	11,25	5	51,90
GRAND TOTAL		**559,96**	**559,96**	**59,14**	**94,25**	**461,27**	**82,37**	**-**	**12.657,11**

- In Magdalena MU, the potential sowing area corresponds to 410,10 ha of the 478,87 ha that the Management Unit has, with a difference of 68,77 ha over the total (the Potential Sowing Area corresponds to the area end identified as suitable for planting palm oil taking into account the results of the HCV study, fragile or vulnerable soils, high carbon reserves and greenhouse gases).
- In Mercedes MU, the potential sowing area corresponds to 51,16 ha of the 81,09 ha that the Management Unit has, with a difference of 29,93 ha over the total (the Potential Planting Area corresponds to the area end identified as suitable for planting palm oil taking into account the results of the HCV study, fragile or vulnerable soils, high carbon reserves and greenhouse gases).
- In Magdalena MU, the potential sowing area is 85,64 % of the total area of the MU, taking into account that in extension the coverage of clean and cultivated pastures predominates.
- In Mercedes MU, the potential sowing area is 63,09 % of the total area of the MU taking into account that in extension the coverage of pastures with shrubs predominate.
- The HCV net area corresponds to 59,14 ha, being for Magdalena MU 35,13 ha and for Mercedes MU 27,91 ha.

- The general HCVMA is 94,25 ha, being for Magdalena MU 72,06 ha and for Mercedes MU 31,07 ha.
- Land covers considered unfit for sowing correspond to the HCVMA, HCV areas, and other coverings such as artificialized territories or water bodies.
- The total carbon stock in Magdalena MU is 4,981.22 tC, where pastures land cover is the one that generates the greatest fixation with 2.193,15 tC, this being the largest coverage within the Management Unit with an occupation of 438,6 ha.
- The total carbon stock in Mercedes MU is 7.675,78 tC, where dense forest land cover is the one that generates the greatest fixation with 7,177.04 tC. However, the land cover of greater extension correspond to pastures with shrubs (38,40 ha). These results reflect the relationship that exists between the area of a cover and the proportion of Carbon that it is capable of fixing, according to the estimate of the RSPO (tC/ha), because in this case, although the Pastures occupy a greater surface in the evaluated area, do not generate a fixation of Carbon as considerable as the dense forest (which have less surface area), so when considered as palm oil sowing potential, they would generate a positive effect by generating greater Carbon fixation.
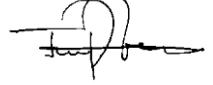
5   HCV, ESIA AND GHG MANAGEMENT PLANS

5.1   Team responsible for the development of HCV, ESIA and GHG management plans

The team of the company Palmas del Ixcán responsible for the execution and development of the HCV, ESIA and GHG management plans is:

No.	Name	Organization	Contact
1	Luis Oliva	Palmas del Ixcán	loliva@pdigt.com
2	Ana Contreras	Palmas del Ixcán	acontreras@pdigt.com
3	Hugo Mérida	Palmas del Ixcán	hmerida@pdigt.com
4	Juan Pablo Zorro	BioAp S.A.S.	juan.zorro@bioap.com.co

Below is the team responsible for the execution and start-up of the plans and management and mitigation proposed for the new plantations, with their formal signature.

Lic. Luis Oliva Administrative Manager	Inga. Ana Contreras Position: Certifications chief	Ing. Hugo Mérida Position: Environmental management chief	Juan Pablo Zorro Cerón BioAp S.A.S.

5.2   Organization chart of the responsible team

ADMINISTRATIVE MANAGER
Luis Oliva

HEAD OF CERTIFICATIONS
Ana Contreras

CHIEF OF ENVIRONMENTAL MANAGEMENT
Hugo Mérida

CONSULTANT
Juan Pablo Zorro
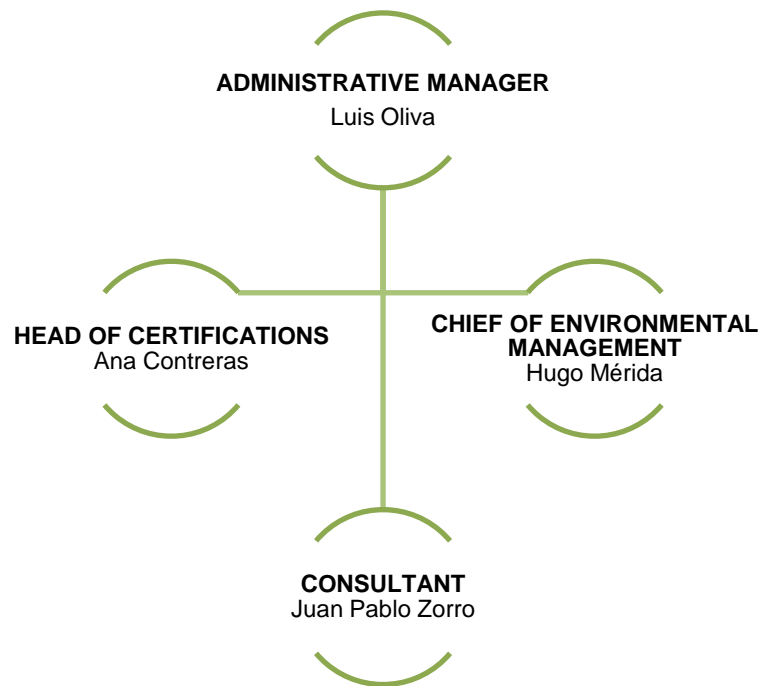
5.3 Summary of management plans

In the Table 41, *Table 42*, *Table 43* shows the resume of the management plans for the company Palmas del Ixcán.

Table 41. Summary of management plans to be implemented.

No.	Management program	Impacts	Objective of the plan-developed measures	Study
1	Plan for the regulation and control of traffic	• Changes in traffic and road infrastructure	• Design, implement and evaluate security protocols in which mobility routes, transit times (peak time) and critical zones of accident risk are identified. • Implement the necessary preventive and corrective measures to avoid and mitigate the impact on existing infrastructure and service networks. • Verify the conditions of the vehicles and the contractor in terms of load capacity, mechanical and physical health and mental health of the driving staff in order to minimize the impact in the area of influence.	SIA
2	Community Relations Program: Management, Communication, Information and Community Participation	• Changes in living conditions. • Conflict in community relations.	• Promote spaces for the participation of the communities in the areas of influence (COCODES, social and community organizations, representatives of public and private entities, etc.), where deliberation, decision-making and shared commitments are encouraged in favor of the development of the communities. • Provide timely, clear and transparent information to the communities regarding the actions of the company and all the topics of interest and community relevance. • Address complaints or claims, suggestions, requests for information presented by the community or citizens, providing timely and adequate attention	SIA
3	Training Strategy and Strengthening local capacities and competences for Work in palm oil and other production lines	• Changes in the local economy	• Strengthen the skills and competencies of the local workforce for skilled and unskilled labor in palm • Link skilled labor to the project, coming from the area	SIA

No.	Management program	Impacts	Objective of the plan-developed measures	Study
			• Generate dynamics of ownership of the development of their communities within the new professionals and technicians of the area	
4	Dust mitigation in the sowing of the crop	• Changes in air quality	• Mitigate the dust in the sowing of the crop without the need of irrigation	EIA
5	Sampling to verify air quality	• Changes in air quality	Three months after the total sowing of the crop, the following will be done: • Samples taken for 24 hours of concentrations of suspended particles less than 10 microns and total, sulfur dioxide and nitrogen, the comparison parameters will be those of USEPA.	EIA
6	Dust mitigation in the sowing of the crop	• Changes in soil quality	• Mitigate the dust in the sowing of the crop without the need of irrigation	EIA
7	Sowing of species that cover the soil	• Changes in soil quality	• When the soil permits, sowing of species that cover the soil will be done	EIA
8	Final disposal of agrochemicals	• Changes in soil quality	• Implement AGREQUIMA's Campo Limpio program for the final disposal of the products used in this project.	EIA
9	Monitoring of surface water bodies: pH, Temperature, COD, BOD and Dissolved Oxygen.	• Changes in water quality	• Hiring the services of a private laboratory to perform the sampling.	EIA
10	Water product of washing backpacks.	• Changes in water quality	• Use of the BIODEP'S	EIA

Table 42. Summary of management plans to be implemented GHG

No.	Management program	Impacts	Objective of the plan-developed measures	Study
1	Field implementation of organic fertilizers	• Changes in air quality. • Changes in soil quality.	• Implementation in the field of organic fertilizers as prepared Biofertilizers, in order to obtain an optimum for the growth of the palms,	GHG
2	Reduce the amount of application of chemical fertilizers in the field	• Changes in air quality. • Changes in soil quality.	• Make a plan to reduce the use of chemical fertilizers in the field and generate a reduction in GHG	GHG
3	Use of coverages legume	• Changes in air quality. • Changes in soil quality.	• Promotion of the use of legume cover to reduce the use of inorganic nitrogen fertilizers	GHG
4	Weed maintenance manually	• Changes in air quality. • Changes in soil quality.	• Perform the maintenance of the weeds inside the bowl manually, using either hoe or machete, to reduce or eliminate the use of	GHG

			herbicides	
5	Sowing of native species	• Changes in air quality. • Changes in soil quality.	• Incorporation into the ecosystem of native foresters in those free areas.	GHG
6	Maintenance of machinery and tools	• Changes in air quality. • Changes in soil quality.	• Design and implementation of a periodic maintenance plan for machinery and tools based on fossil fuels.	GHG
7	Reduce fossil fuel consumption and improve the efficiency of using it.	• Changes in air quality. • Changes in soil	• Implement a plan to reduce fossil fuel consumption and improve its efficiency, and thus reduce CO_2 emissions	GHG
8	Plan for saving and efficient use of energy	• Changes in air quality. • Changes in soil quality.	Implementation of a plan for saving and efficient use of energy in the Mill.	GHG

Table 43. Management and Monitoring recommendations.

HCV	Management	Monitoring
HCV 1	• According to the proposed measures for the management of HCV 1 areas (HCVMA), a riparian buffer zone of 20 meters is proposed around the HCV 1 areas identified within the MU. In this zone, the recovery of natural vegetation (through reforestation) is proposed, in order to generate a natural barrier between HCV 1 areas and oil palm plantations.	• Design a format in which you record the number of plants to be planted in the buffer zone (HCVMA 1), accompanied by its respective photographic record that serves as a support for the actions carried out. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
	• Implement policies of NO deforestation, NO hunting, NO fishing and NO Company-designed burning (code GAI-DPA-POL-02 and GAI-DPA-POL-04), accompanied by internal and external environmental awareness.	• (# awareness talks held / # awareness talks programmed) *100
	• Implement an internal work regulation that sanctions workers that perform hunting, timber extraction, fishing, and burning inside the MU. After the sanction, a plan must be established in which the worker is environmentally aware, so that he/she avoids repeating said actions in the future	• Design a format in which you record the number of workers sanctioned in a period, for example, a month. • (#awareness talks held / # awareness talks programmed) *100 • Lists of attendance at the awareness talks of both workers and other interested parties. • Information on poaching, illegal logging, and land use change should be collected and analyzed at least quarterly to determine the magnitude of the damage done and, formulate strategies that delay its evolution.
	• Install signage related to the prohibition of hunting, logging, fishing and burning in areas of high human flow and where areas considered HCV 1 are considered vulnerable.	• # of signals "Hunting forbidden" installed. • # of signals "Logging forbidden" installed. • # of signals "Fishing forbidden" installed. • # of signals "Burning forbidden" installed.
	• Designate and clearly delimit HCV 1 areas and their respective management areas (HCVMA 1), for example, with a well-laid stone path around these areas or through linear reforestation with native species.	• Design a format in which you record the number of plants to be planted for the delimitation of areas HCV 1 and HCVMA 1, accompanied by their respective photographic record that serves as a

HCV	Management	Monitoring
		support to the actions developed. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
	• Install signage in areas of high traffic of people that allows the identification of HCV 1 areas. The signage can be accompanied by information panels that contain relevant information about what an HCV 1 is; what its importance is, and why it is necessary to protect the areas considered with High Conservation Values. These panels may be accompanied by photographs of the RTE species identified in the HCV 1 areas.	• # of signals "HCV 1 Area" installed. • # Information panels "HCV 1 Area" installed.
	• Build wildlife crossings in the areas that you consider necessary and viable, with the corresponding signage.	• # of wildlife crossings constructed. • # of "wildlife crossing" signage installed.
	• Provide workers with a pocket-booklet with a brief text related to HCV 1 areas, and accompanied by allusive images that facilitate their understanding.	• (# of booklets - brochures delivered/ # of workers) *100.
	• Design and implement annual internal wildlife and flora monitoring program, confirming or dismissing the presence of RTE species in the MUs.	• Monthly monitor HCV 1 areas in order to follow-up and control the possible extraction of fauna and flora species. Monitoring must be carried out by a properly trained person. • Perform annual monitoring on the presence and abundance of RTE species, so that a follow-up and comparison of them is generated in the HCV 1 areas.
	• Record appropriately the deforestation events that may occur, indicating the date, the place and a photograph that evidences the area. If the deforestation events occur in HCVMA 1, ensure to reforest the area affected in such a way as to maintain the vegetation coverage present.	• Design a format in which you record the date, place and photograph of the deforestation incidents that occur in the HCV 1 areas. • # Deforestation events presented in HCV 1 areas and/or their management areas in a period of 1 month.
	• Ensure that the construction of infrastructure, roads, trails, irrigation or drainage lines do not encourage the fragmentation of HCV 1 areas or their management areas. In this way, the infrastructure, roads, trails, and irrigation or drainage lines should be as far as possible from the HCV 1 areas.	• Design a location map of the entire infrastructure present in each of the MUs, in order to demonstrate its distance from HCV 1 areas or its HCVMA.
	• Design and implement, in conjunction with some stakeholders and workers, environmental awareness programs on issues related to HCV 1.	• (#awareness talks held / # awareness talks programmed) *100 • Lists of attendance to the awareness talks of both workers and other interested parties.
	• Design Standard Operational Procedures (SOPs) for the clearing and maintenance activities of plantation areas, so as to ensure the proper execution of the same by the company's personnel.	• (# of disclosures of the SOPs made to the company's staff/ # of disclosures to be performed) *100. • Attendance lists to disclosure meetings
	• Apply the differentiated handling strip of agrochemicals in the buffer zone of HCV 1, which must be properly demarcated and signaled. In these areas, use 100 % organic products.	• Keep a record of the date, time and place in which applications of agrochemicals and/or fertilizers were done, specifying the product applied, its quantity and the person in charge and/or responsible for the development of the activity.
	• Install signage on "Prohibited the application of	• # Signs of "Prohibited the applications of

HCV	Management	Monitoring
	agrochemicals" in HCV 1 areas or their respective management areas.	agrochemicals" in areas HCV1 or HCVMA 1 installed.
	• Train company personnel in the responsible use of agrochemicals.	• (# of trainings on the handling and use of agrochemicals done / # of trainings programmed) *100. • Trainings assistance lists.
	• Establish agreements with the population that requires admission to the MU, establishing transit routes for the protection of HCV 1 areas. • Speak directly and respectful to people entering the MU and make sure they know the limit of private property; If necessary, take the legal measures that you consider pertinent.	• Design a map of community transit trails within the MU, and expose it to the parties involved. Report the internal policies of the company regarding the protection of HCV 1 areas and notify the COCODE in case of non-compliance or damage. • (#of meetings held with the population that enters the MU/ # od meeting programmed) *100 • Attendance lists of meetings with stakeholders.
HCV 3	• According to the proposed measures for the management of HCV 3 areas (HCVMA), a buffer zone of 20 meters is proposed around the HCV 3 areas identified within the MU. In this zone, the recovery of natural vegetation (through reforestation) is proposed, in order to generate a natural barrier between HCV 3 areas and oil palm plantations.	• Design a format in which you record the number of plants to be planted in the buffer zone (HCVMA 3), accompanied by its respective photographic record that serves as a support for the actions carried out. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate
	• Avoid the use of cover crops (ex: *Pueraria sp*) in areas near HCV 3 (Keep in mind the management areas recommended in this document).	• Design a format in which you record the species planted as a cover crop and support this information with a photographic record in which you can see their distance from the HCV 1 and HCVMA 1.
	• Implement the SOP on the control of cover crops, thus that short control cycles are managed and the expansion and introduction of these into HCV 3 areas is avoided.	• (# SOP disclosures performed to the company's staff/ # disclosures programmed to be performed) *100. • Attendance lists.
	• Implement policies of NO deforestation, NO hunting, NO fishing and NO Company-designed burning (code GAI-DPA-POL-02 and GAI-DPA-POL-04), accompanied by internal and external environmental awareness	• (# awareness talks held / # awareness talks programmed) *100
	• Designate and clearly delimit HCV 3 areas and their respective management areas (HCVMA 3), for example, with a well-laid stone path around these areas or through linear reforestation with native species.	• Design a format in which you record the number of plants to be planted for the delimitation of areas HCV 3 and HCVMA 3, accompanied by their respective photographic record that serves as a support to the actions developed. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
	• Install signage in areas of high traffic of people that allows the identification of HCV 1 areas. The signage can be accompanied by information panels that contain relevant information about what an HCV 1 is; what its importance is, and why it is necessary to	• # of signals "HCV 3 Area" installed. • # Information panels "HCV 3 Area" installed.

HCV	Management	Monitoring
	protect the areas considered with High Conservation Values. These panels may be accompanied by photographs of the ecosystems and vegetation catalogued as HCV 3 areas.	
	• Install signage related to the prohibition of logging and burning in areas of high human flow and where there is a vulnerability to the areas considered HCV 3.	• # of signals "Logging forbidden" installed. • # of signals "Burning forbidden" installed.
	• Implement an internal work regulation that sanctions workers that perform hunting, timber extraction, fishing, and burning inside the MU. After the sanction, a plan must be established in which the worker is environmentally aware, so that he/she avoids repeating said actions in the future.	• Design a format in which you record the number of workers sanctioned in a period, for example, a month. • (#awareness talks held / # awareness talks programmed) *100 • Lists of attendance at the awareness talks of both workers and other interested parties. • Information on poaching, illegal logging, and land use change should be collected and analyzed at least quarterly to determine the magnitude of the damage done and, formulate strategies that delay its evolution.
	• Design and implement, in conjunction with some stakeholders and workers, environmental awareness programs on issues related to HCV 3.	• (#awareness talks held / # awareness talks programmed) *100 • Lists of attendance to the awareness talks of both workers and other interested parties.
	• Provide workers with a pocket-booklet with a brief text related to HCV 3 areas, and accompanied by allusive images that facilitate their understanding.	• (# of booklets - brochures delivered/ # of workers) *100.
	• Protect HCV 3 areas and their respective HCVMA through reforestation with interspersed native species, in order to increase the area of forest cover.	• Design a format in which you record the number of plants to be planted for the delimitation of HCV3 and HCVMA 3, accompanied by their respective photographic records that serve as evidence of the actions developed and help the future implementation. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
HCV 4	• According to the proposed measures for the HCV 4 management areas (HCVMA), a riparian buffer zone of 10 meters around the bodies of lotic water (temporary or permanent), and 50 meters around the water spring, associated with differentiated handling of 10 additional meters. In the water protection round, the active management of natural vegetation (through reforestation) is proposed, while in the differentiated handling strip the use of organic products is proposed in order to avoid affecting the water round and water bodies. • Riparian vegetation that has been cleared for any reason must be reforested by the company	• Design a format to register the number of plants to be planted in the riparian buffer zone (HCV 4), accompanied by its respective photographic record that serves as a support to the actions developed. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
	• The new developments should keep away from crossing riparian areas classified as HCV 4. In the case of highways and roads, these should abstain	• Design a map location of the roads, routes, and irrigation and/or drainage lines present in each of the MUs so that their

HCV	Management	Monitoring
	from passing through these areas and, if unavoidable, the necessary infrastructure should be built to avoid affecting them (bridges or culverts).	distance from HCV 4 areas or their management areas is evidenced.
	• Implement policies of NO deforestation, NO hunting, NO fishing and NO Company-designed burning (code GAI-DPA-POL-02 and GAI-DPA-POL-04), accompanied by internal and external environmental awareness.	• (# awareness talks held / # awareness talks programmed) *100
	• Implement an internal work regulation that sanctions workers that perform hunting, timber extraction, fishing, and burning inside the MU. After the sanction, a plan must be established in which the worker is environmentally aware, so that he/she avoids repeating said actions in the future.	• Design a format in which you record the number of workers sanctioned in a period, for example, a month. • (#awareness talks held / # awareness talks programmed) *100 • Lists of attendance at the awareness talks of both workers and other interested parties. • Information on poaching, illegal logging, and land use change should be collected and analyzed at least quarterly to determine the magnitude of the damage done and, formulate strategies that delay its evolution.
	• Install signage related to the prohibition of hunting, logging, fishing and burning in areas of high human flow and where areas considered HCV 4 are considered vulnerable	• # of signals "Hunting forbidden" installed. • # of signals "Logging forbidden" installed. • # of signals "Fishing forbidden" installed. • # of signals "Burning forbidden" installed.
	• Designate and clearly delimit HCV 4 areas and their respective management areas (HCVMA 4), for example, with a well-laid stone path around these areas or through linear reforestation with native species.	• Design a format in which you record the number of plants to be planted for the delimitation of areas HCV 4 and HCVMA 4, accompanied by their respective photographic record that serves as a support to the actions developed. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
	• Install signage in areas of high traffic of people that allows the identification of HCV 4 areas. The signage can be accompanied by information panels that contain relevant information about what an HCV 4 is; what its importance is, and why it is necessary to protect the areas considered with High Conservation Values. These panels may be accompanied by photographs of the water bodies and riparian buffer zones present in the MUs.	• # of signals "HCV 4 Area" installed. • # Information panels "HCV 4 Area" installed.
	• Design and implement, in conjunction with some stakeholders and workers, environmental awareness programs on issues related to HCV 4.	• (#awareness talks held / # awareness talks programmed) *100 • Lists of attendance to the awareness talks of both workers and other interested parties
	• Provide workers with a pocket-booklet with a brief text related to HCV 4 areas, and accompanied by allusive images that facilitate their understanding.	• (# of booklets - brochures delivered/ # of workers) *100.

HCV	Management	Monitoring
	• Design and implement a SOP or Management Plan - MP- for the application of agrochemicals outside the HCV or HCVMA areas, as well as for the washing of the containers or equipment containing these products; similar to the Cultural MP At the edges of tributaries that the company has (code GAI-DPA-PLN-01), in which defines the type of management to be used in the differentiated management band around the HCVMA 4.	• (# of disclosures of the SOPs made to the company's staff// # of disclosures to be performed) *100. • Attendance lists to disclosure meetings
	• Design and implement a management program on the use of agrochemicals and the management and disposal of solid wastes generated by the MU during the productive activity.	• (# of disclosure meetings of the disposal program made to the company's staff// # of disclosures to be performed) *100. • Attendance lists to disclosure meetings.
	• Install signage on "Prohibited the application of agrochemicals in HCV 4 areas" and/or their respective management areas.	• # Signs of "Prohibited to apply agrochemicals in areas HCV 4 or HCVMA 4" installed.
HCV 5	• According to the proposed measures for the management of HCV 5 areas (HCVMA), a 50-meter riparian buffer zone is proposed around the HVC 5 areas identified within the MU. In this zone, the recovery of natural vegetation (through reforestation) is proposed, in order to generate a natural barrier between HCV 1 areas and oil palm plantations.	• Design a format in which you record the number of plants to be planted in the buffer zone (HCVMA 5), accompanied by its respective photographic record that serves as a support for the actions carried out. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
	• Designate and clearly delimit HCV 5 areas and their respective management areas (HCVMA 5), for example, with a well-laid stone path around these areas or through linear reforestation with native species.	• Design a format in which you record the number of plants to be planted for the delimitation of areas HCV 5 and HCVMA 5, accompanied by their respective photographic record that serves as a support to the actions developed. • Biannually monitor the growth of the plants planted by registering the height of the plants, the number and the size of leaves in weekly or monthly periods, as appropriate.
	• Design and implement a management program on the use of agrochemicals and the management and disposal of solid wastes generated by the MU during the productive activity.	• (# of disclosure meetings of the disposal program made to the company's staff// # of disclosures to be performed) *100. • Attendance lists to disclosure meetings.
	• Install signage on "Prohibited the application of agrochemicals in HCV 5 areas" and/or their respective management areas.	• # Signs of "Prohibited to apply agrochemicals in areas HCV 5 or HCVMA 5" installed.
	• Generate consensus of protection of HCV 5 areas with the surrounding communities.	• # Acts of consensus with the COCODE members • # Attendance list of disclosure meetings • # Record of non-compliance cases with agreements and measures to be taken to face the situation
	• Design guidelines for the use of resources (water) within the MU.	• Map of authorized community transit routes within the MU. • Assistance list to the participatory construction of guidelines • Consensus document by interested parties. • Evidence of the guidelines divulgation. • # of cases of non-compliance with

HCV	Management	Monitoring
		guidelines and corrective measures implemented.
	• Establish alliances with government entities and nearby companies to develop reforestation activities on water bodies.	• Acts of approaches and agreements established with governmental entities • (#of projects or activities launched / # f projects or activities agreed) *100
	• Establish a monitoring and monitoring schedule for water treatment processes and comply with the regulations established for such purposes.	• (# of water monitoring performed /# of water monitoring programed) * 100

6   INTERNAL RESPONSIBILITY

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Guatemala, January 8th, 2019

RSPO
To whom It May Concern

The objective of this letter is to express that the company Palmas del Ixcán expresses its agreement with the results of all the studies that have been carried out to comply with the requirements of the RSPO New planting procedure (EIS, EIA, AVC, LUCA, GEI, soil suitability) and that the general administration is fully committed to monitoring and executing the proposed action plan, providing financial and human resources to fulfill it.
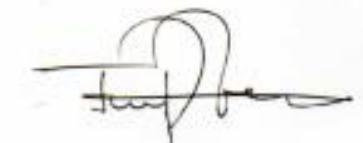
Lic. Luis Oliva
Administrative Manager
loliva@pdigt.com

Therefore, the company has a group of professionals specialized in each subject:

Inga. Ana Contreras
Position: Certifications chief
e-mail: acontreras@pdigt.com

Ing. Hugo Mérida
Position: Environmental management chief
e-mail: hmerida@pdigt.com

Juan Pablo Zorro Cerón
BioAp S.A.S.

6.1 Information of the organization and contact person

Name of the company	PALMAS DEL IXCÁN LIMITADA
Address	Euro Plaza, Tower 3, Suite room 1101. 5ª Avenue 5-55, Zone 14. Guatemala.
Phone	(502) 2328-3700
Contact person	Luis Oliva Administrative manager e-mail: loliva@pdigt.com Ana Contreras Certifications Chief e-mail: acontreras@pdigt.com Hugo Mérida Environmental Management Chief e-mail: hmerida@pdigt.com
Geographic location	Republic of Guatemala.

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