

FRESH BREEZE AFFORESTATION PROJECT



Document Prepared By CO2 Solutions

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PROJECT DETAILS

1.1 Summary Description of the Project

The Fresh Breeze afforestation project covers 4,269.82, hectares of land, which are adjacent to cattle, on which forest plantations for obtaining high-value, long-lived timber products and for sequestering large amounts of carbon dioxide from the atmosphere will be established. The project activity is established in the states of Tabasco, Nayarit and Chiapas, Mexico.

The project activity is categorized as a grouped project due to the project foresees an average expansion of 1,200 hectares per year, adding new project areas and instances from the future years.

The project will result in a significant contribution to sustainable development of Mexico, mainly through: i) increased employment and quality of employment; ii) rural development (decentralization); iii) increased gross value of production; iv) improved fiscal balance; v) biodiversity preservation and vi) improvement and preservation of soil quality.

Overall objective of proposed A/R project activity

The overall objective of the A/R activity is to contribute to mitigate climate change while meeting the growing demand for quality wood products from well managed plantation forests and contributing to sustain environmental management, community development and poverty alleviation in Mexico.

Specific objectives of the proposed A/R project activity

- 1) Capture carbon dioxide through forest planting, generating high quality emission reductions in greenhouse gases (GHG) that can be measured, monitored and verified. The project participants strive to demonstrate that carbon sequestration from forest plantations is a viable instrument to encourage private investment in the forestry sector, especially on degraded lands.
- 2) Promote environmental conservation such as soil conservation, water sources and biodiversity of the region, protection of flora and fauna species. Proteak UNO SAB de C.V. has a protection program of species during and after the project implementation.
- 3) Take care of the biodiversity, creating biological corridors within our plantations
- 4) Socio-Economic development in the local communities through:
 - Promoting tree plantation and afforestation activities in the local communities.
 - Providing employment opportunities.
 - Proteak UNO S.A.B. de C.V. supports its employees paying them social insurance (which is not the common practice in other companies of the region).
- 5) Develop local infrastructure; including roads, health centers, water supply and communication systems.

1.2 Sectoral Scope and Project Type

The project is classified as a grouped project because new areas will be included in the future.

The sectoral scope of this project is Agriculture, Forestry and Other Land Uses (AFOLU). Within this category the project is of the Afforestation, Reforestation, Revegetation (ARR) type.

- The voluntary project activity, although being applied at the voluntary market, shall make use of the following approved CDM methodology:
 - AR-ACM0003: Afforestation and reforestation of lands except wetlands v 1.0.0

- Being developed within the forestall sector, the proposed project activity can be classified on the sectoral scope No.14: “Agriculture, Forestry, Land Use”, AFOLU project category ARR (afforestation, reforestation and re-vegetation), activity type: Afforestation.

According to the AFOLU Requirements version 3.4 the following general requirements must be fulfilled by the project activity in order to apply to be an eligible afforestation project.

“4.2.1. Eligible ARR activities are those that increase carbon sequestration and/or reduce GHG emissions by establishing, increasing or restoring vegetative cover (forest or non-forest) through the planting, sowing or human-assisted natural regeneration of woody vegetation. Eligible ARR projects may include timber harvesting in their management plan. The project area shall not be cleared of native ecosystems within the 10 year period prior to the project start date, as set out in Section 3.1.6. of the VCS AFOLU requirements”.

In this case the Fresh Breeze Afforestation project is in line with the eligibility conditions of the AFOLU requirements due to the project increase the carbon sequestration through the planting of woody vegetation; the project include timber harvesting in their management plan (demonstrated with the management plan of the project) and the lands weren't native ecosystems (demonstrated with the photos of each plantation). As a grouped project the future plantations of the project will be in line with the eligibility requirements of the VCS.

1.3 Project Proponent

Organization name	Proteak UNO S.A.B. de C.V.
Contact person	Lourdes González
Title	Financial Analyst
Address	Tres Picos 65, México City, ZIP 11580, México.
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1.4 Other Entities Involved in the Project

Organization name	Carbon Solutions de México S.A. de C.V.
Role in the project	Environmental Consulting, in charge of Project Description (PD) preparation as well as Project Description and Monitoring Report delivery to the Validation/Verification body according to VCS guidelines and procedures.
Contact person	Alejandro Eliud Araizaga Esquivel
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1.5 Project Start Date

According to VCS Program Definitions 3.5, project start date is the date on which the project began generating GHG emission reductions or removals.

According to the VCS AFOLU Requirement version 3.4, in section 3.2 is stated that the project start date of an AFOLU project is the date when activities that lead to the GHG emission removals are implemented.

In the case of Fresh Breeze Afforestation Project the date of July, 2009¹ correspond to the date when started the plantations of the Plantation Tintal, this event correspond to the first activity that lead the GHG removal of the project.

1.6 Project Crediting Period

The crediting period has been defined to be of 54 years, non renewable, from July 1 2009 to June 30 2062.

Thus, the proposed crediting period is in compliance with requirements of section 3.8 of VCS Standard and section 3.3.2 of AFOLU Requirements as its length is between 20-100 years and it is set to include at least one complete harvest/cutting cycle for all plantations till 2020.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Fresh Breeze Afforestation project is classified as “project” according its scale; it will remove an average of 52,573 CO₂ per year during the 54 years crediting period.

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1 (1 July 2009 - 30 June 2010)	10,103
Year 2	28,791
Year 3	62,520
Year 4	115,884
Year 5	153,444
Year 6	231,137
Year 7	299,063
Year 8	368,540
Year 9	394,437

¹ The exact date is not available, the document of CONAFOR only establish month and year. Could be considered as a conservative date the 1 of July 2009.

Year 10	478,086
Year 11	474,160
Year 12	477,911
Year 13	545,374
Year 14	647,236
Year 15	785,404
Year 16	815,237
Year 17	946,944
Year 18	971,104
Year 19	994,032
Year 20	970,772
Year 21	957,328
Year 22	944,106
Year 23	893,389
Year 24	855,797
Year 25	838,849
Year 26	-2,502,871
Year 27	-2,005,630
Year 28	-3,339,627
Year 29	-3,363,853
Year 30	-2,687,261
Year 31	231,137
Year 32	299,063
Year 33	368,540
Year 34	394,437
Year 35	478,086
Year 36	474,160
Year 37	477,911
Year 38	545,374
Year 39	647,236
Year 40	785,404
Year 41	815,237
Year 42	946,944
Year 43	971,104
Year 44	994,032
Year 45	970,772
Year 46	959,597
Year 47	945,795
Year 48	895,764
Year 49	858,053
Year 50	840,591
Year 51	-5,092,716
Year 52	549,280
Year 53	-3,399,772

Year 54 (1 July 2061- 30 June 2062)	-3,477,480
Total estimated ERs	2,838,962
Total number of crediting years	54 years
Average annual ERs	52,573

Estimated GHG removals for the project crediting period, includes VCS buffer. The calculation of the emission reductions follows the VCS AFOLU Requirements for ARR projects with harvesting and the AFOLU Guidance “Example for Calculating the Long-Term Average Carbon Stock for ARR Projects with Harvesting”, with a long-term average GHG benefit of 5,814,537 tCO₂, then, after applying the buffer account the total emission reductions are 4,660,576 tCO₂.

Year	Estimated GHG emission reductions or removals (tCO ₂ e) with LTA	VCUs with Buffer
Year 1 (1 July 2009 - 30 June 2010)	10,103	8,284
Year 2	28,791	23,608
Year 3	62,520	51,266
Year 4	115,884	95,024
Year 5	153,444	125,823
Year 6	231,137	189,532
Year 7	299,063	245,231
Year 8	368,540	302,203
Year 9	394,437	323,438
Year 10	478,086	392,030
Year 11	474,160	388,811
Year 12	477,911	391,887
Year 13	545,374	447,207
Year 14	647,236	530,733
Year 15	785,404	644,031
Year 16	742,446	501,468
Year 17	0	0
Year 18	0	0
Year 19	0	0
Year 20	0	0
Year 21	0	0
Year 22	0	0
Year 23	0	0
Year 24	0	0
Year 25	0	0
Year 26	0	0

Year 27	0	0
Year 28	0	0
Year 29	0	0
Year 30	0	0
Year 31	0	0
Year 32	0	0
Year 33	0	0
Year 34	0	0
Year 35	0	0
Year 36	0	0
Year 37	0	0
Year 38	0	0
Year 39	0	0
Year 40	0	0
Year 41	0	0
Year 42	0	0
Year 43	0	0
Year 44	0	0
Year 45	0	0
Year 46	0	0
Year 47	0	0
Year 48	0	0
Year 49	0	0
Year 50	0	0
Year 51	0	0
Year 52	0	0
Year 53	0	0
Year 54 (1 July 2061- 30 June 2062)	0	0
Total estimated ERs	5,814,537	4,660,576
Total number of crediting years	54 years	54 years

The spread sheet of the project activity describes the calculation of the LTA which is 5,814,537 tCO₂; however, taking into account the Buffer account (according the risk tool) which is 1,153,961 tCO₂ the Maximum VCU allowed for the project activity are 4,660,576 tCO₂. By the time the project activity reach the LTA value no more VCU credits can be issued. The Long Term Average is reached in the year 16 of the crediting period (2024).

1.8 Description of the Project Activity

The project comprises the afforestation in Mexico territory; the main objectives of the project activity are wood production, land restoration and carbon sequestration through afforestation.

The next table shows the actual plantation hectare of the project activity.

Years	Ha of plantation
2009	937.85
2010	698.03
2011	981.50
2012	932.44
2013	720

Table 1. Actual area of plantation of the project activity.

The project activity is categorized as a grouped project with an expansion plan of 1200 ha per year at least until the year 2020.

Years	Ha of plantation
2014	1200
2015	1200
2016	1200
2017	1200
2018	1200
2019	1200
2020	1200

Table 2. Future expansion plan of the project activity as a grouped project.

The land selected for plantation of *Tectona grandis*, commonly called "Teak" has optimal conditions for the development of this kind, which are:

- Height: between 0 and 800 masl (meters above sea level)
- Soil: rich in calcium, flat and well drained.
- In the rainy season: between 1,500 and 2,500 mm annual rainfall or older.
- Dry season: with a minimum of 10 to 50 mm of rain, with a maximum of 3 months.
- Requires climates with a distinct dry season (3-5 months), with annual average temperatures between 22 and 28°C, an average annual rainfall of 1.250 to 2.500 mm and altitudes between 0 and 1,000 meters

In summary, Teak is a species that has the best growth of tropical wood, also it is the most likely to play in planting, this due to its resistance to fire, pests. Likewise, Proteak UNO S.A.B. has detailed a maintenance plan in order to obtain the best possible production of wood. The lifetime of the project activity depends of the harvest/cutting cycle of the Teak which is 25 years; the project activity contemplates the plantations of the year 2009 to year 2020, which means than if we considered the complete cycle of the year 2020 the project longevity will be of 61 years.

The project longevity considers two cycles of the teak for that reason the project longevity is 61 years:

- The forestry management plan of each project plantation demonstrates that Proteak contemplate a two harvest/cutting cycle. The forestry program contemplates the operation chronogram of each plantation, it is demonstrated that the forestry program considers two cutting/harvest cycle for example for the El Capri plantation which starts in year 2013, has the final cutting process in the year 2062, according to the literature the harvest/cutting cycle of the teak is 25 years, which means that the chronogram was made for two cycles (50 years).
- Proteak gave evidence that demonstrate the continuity of the project activity due to the compromise that the project obtains with the FSC Certificate. The project activity already

has renewed the first accreditation of the FSC certificate, this event demonstrate the continuity of the project activity.

- All the project activity plantations have a purchase agreement², with this contract it secures the proof of title for carbon credits for the whole project longevity. This has been supported through contracts for the first instance. However, any additional instances are to follow a likewise process.

Proteak UNO S.A.B. de C.V. is a company that has the FSC certificate for forestry operations; also the project is created only for forestry purpose. Therefore, the knowhow and the operation of this company is forestry activities that's the main reason that the project activity is expected to be expanded in the next years and as is evidence the purpose is to have other rotation cycle.

The general activities that Proteak UNO S.A.B. de C.V. carries out in order to execute the afforestation project are the followings:

- Selection of the land and management procedures.
 - Site selection according to location, weather and current use of soil.
 - Lands selected must be plane or semi plane, and have minimum level of fertility.
 - Purchase of the land by Proteak UNO S.A.B. de C.V. or use of the land through productive partnership schemes.
 - Generation of employment for the development and managing of the plantations.
 - Arrangement of all permits with SEMARNAT.
 - FSC
- Site preparation, production and preparation of the plant.
 - Land clearing and cleaning.
 - Leveling of the land in order to improve the plantation site.
 - Remove the big stones that could balk or difficult the labor of site preparation.
 - Breaking of the compacted surface layer.
 - Drainage, liming, skirting, tracing the plantation and construction of strain.
 - Seedlings are produced in a nursery garden and when they have the proper size they are transferred to the field.
 - Seedlings will be transported to the site one day before of being planted.
- Establishment and maintenance of the plantation
 - Plantation of the trees in the land. About 1,090 to 1,111 trees will be planted per Ha.
 - No irrigation is used; all the water required by the plantation will be obtained through rainfall.
 - Fertilization will be carried out during the first years of the plantation. Only substances permitted by the environmental law will be used and organic fertilizers will be preferred.
 - During the first years of the plantation the land will be mowed periodically to avoid the scrub to compete with Teak tree's growth.
 - Pruning of the trees will be made in order to obtain a better shape and quality.
 - Protection against pests and diseases.
 - Protection against fires through prevention and firefighting plans.
 - Thinning of the trees.
 - Prevention of invasive alien species in natural vegetation.
 - Monitoring of the plantation.
- Thinning program

² There are two projects that have a rent contract Cascada and Empeño 8 plantations; however the PP is the process to perform the total land purchase. The DOE can be seen through rental contracts, landlord's commitment to pursue the matter by the Agrarian Law for the sale of land.

Fresh Breeze plantations are divided in three types of growth curves, these curves were obtained with a pre-evaluation of Proteak UNO S.A.B. de C.V. The growth curves are³:

- México 1 (México Nayarit). This curve type represents the plantations of the zone of Nayarit.
- México 2 (México Tabasco). This curve type represents the plantations of the region of Chiapas and Tabasco both regions has the same climate conditions.
- México Clon (México Premium). All of Proteak UNO S.A.B. de C.V.'s new plantations are planted with selected genetic material that have a better growth rate than regular seeds, so a new growth curve had to be developed.

The growth curves are based in the Keogh growth curve⁴, which applies to Teak plantations and also according to their climate conditions. As was mentioned before, Proteak UNO S.A.B. de C.V. considers three different growth curves for the plantations in this project, due to how they differ from the Keogh curve.

- México 1 (México Nayarit): The plantations in Nayarit grow a bit slower than the Keogh growth curve.
- México 2 (México Tabasco): These plantations behave exactly as the Keoght growth curve.
- México Clon (México Premium): As mentioned before, clonal material have a better growth rate than regular seeds, and Proteak has developed better forestry techniques, so their new plantations outgrow the Keogh curve

The calculation of each growth curve is attached as evidence.

Also, Proteak UNO S.A.B. de C.V. has elaborated a thinning program according to the type of growth curve, which considers commercial thinning; this analysis is also attached as evidence. This information is used in the emission reductions calculation.

The wood extracted is classified by diameter/circumference; the following table summarizes the diametric classification of the wood:

Classification	Diameter	Circunference
P2	0.12 - 0.16	40-50
P3	0.16 - 0.19	50-60
P4	0.19 - 0.22	60-70
P5	0.22 - 0.26	70-80
P6	0.26 - 0.29	80-90
P7	0.29 - 0.32	90-100
P8	0.32 - 0.35	100-110
P9	0.35 - 0.38	110-120
P10	0.38 - 0.41	120-130
P11	0.41 - 0.45	130-140
P12	0.45 - 0.48	140-150
P13	0.48 +	150 +

Table 3. Diametric classification of the wood

³ In the emission reduction calculation is specified which growth curve uses each plantation.

⁴ Mora, F. Comparación del crecimiento en altura de la Teca (*Tectona grandis*) en Costa Rica con otros trabajos previos y con otras regions del mundo. Page 13, Available at:
http://www.yoque.com.ar/resources/external/material_probabilidad_y_estadistica/ComparaCrecTeca3.pdf

- Final Harvest and commercialization
 - Cutting down the trees, remove branches and cut up.
 - Storing, truck load and transportation to final destination.
 - Commercialization of the final product.
- Roads and forest infrastructure
 - Construction and maintenance of the roads and forest infrastructure.
 - Measures to conserve and protect habitats of wildlife will be carried out:
 - Forest with primary native vegetation will be separated to be preserved.
 - Monitoring plots will be established in areas of preservation.
 - Agreements will be established with NGOs and universities for the proactive management of these areas.

According the AFOLU Requirements the project activity needs to demonstrate that the project is in line with the eligibility conditions.

- Activities that convert native ecosystems to generate GHG credits are not eligible under VCS program.
 - As demonstrated with the photos of each one of the plantations, the land of the project activity weren't part of a native ecosystem; in most of the cases the land have not had a specific use, while in some cases, it was used for cattle.
- Activities that drain native ecosystems or degrade hydrological functions to generate GHG credits are not eligible under the VCS Program
 - The same evidence shows that the land haven't had any hydrological function, therefore the land of the project activities weren't drained.

1.9 Project Location

In this section is stated each plantations that is part of the project activity (from the years 2009-2013), for each plantation it is stated the year that the plantation started and the plantation hectare.

The next figure shows the information of the following properties⁵:

1. Libertad – This property is not part of the project activity because the plantation started in the year 2002.
2. Capitan – The plantation of this property included in the project activity is:
 - a. Plantation year: 2009 – Total Area: 19.42 ha
3. Desenredo – This property is not part of the project activity because the plantation started in the year 2002

⁵ Estudio Ambiental de Impacto al Suelo por la Ejercición del Proyecto de Plantaciones Forestales de la Empresa Proteak UNO S.A.B. de C.V. elaborated by the Registro Nacional Forestal. Pages 2-8 to 2-27.

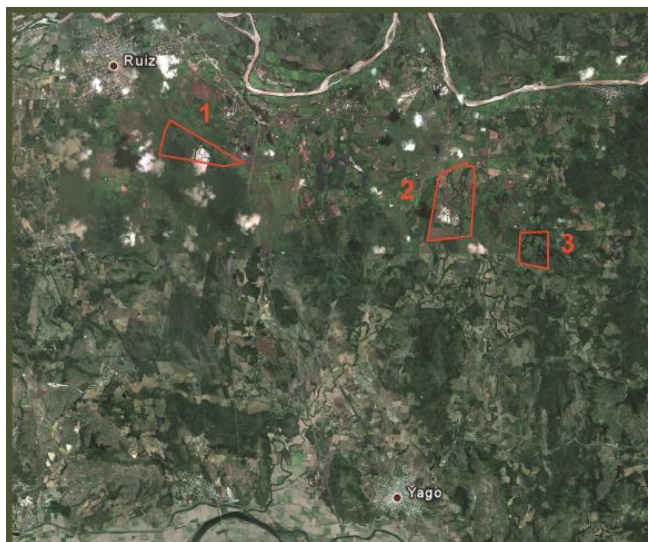


Figure 1. Capitan property.

The next figure shows the information of the following properties:

1. Victoria 7 – The plantation of this property included in the project activity is:
 - a. Plantation year: 2009 – Total Area: 11.06 ha

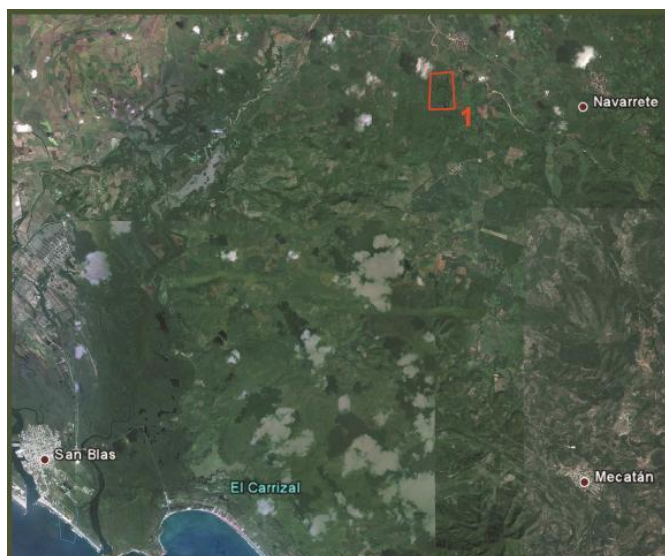


Figure 2. Victoria 7 property.

The next figure shows the information of the following properties:

1. Esperanza – This property is not part of the project activity because the plantation started in the year 2004 to 2007.
2. Ardillas – This property is not part of the project activity because the plantation started in the year 2008.
3. Pediatra – This property is not part of the project activity because the plantation started in the year 2008.
4. Empeño – This property is not part of the project activity because the plantation started in the year 2008.
5. Cascada – The plantation included in the project activity is:
 - a. Plantation year: 2009 – Total Area: 18.92 ha
6. Empeño 8 – The plantation of this property included in the project activity is:

- a. Plantation year: 2009 – Total Area: 13.03 ha

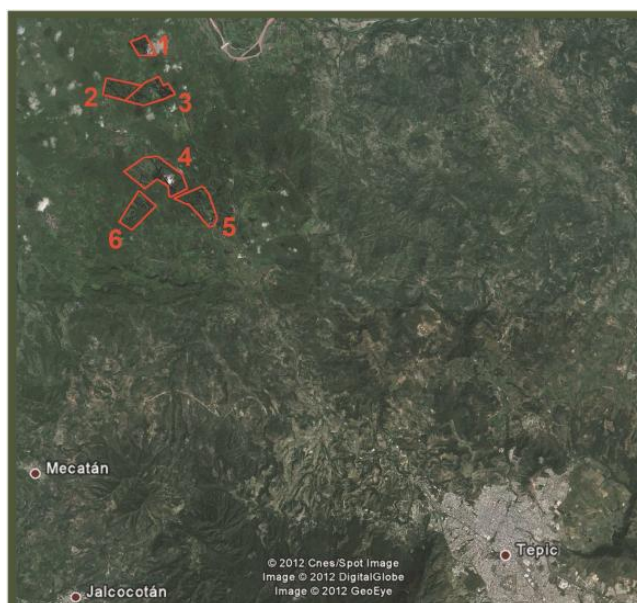


Figure 3. Empeño, Cascada, Empeño 8 properties.

The next figure shows the information of the following properties:

1. Tintal – The plantation of this property included in the project activity is:
 - a. Plantation year: 2009 – Total Area: 347.13 ha
2. Pocito – The plantation of this property included in the project activity is:
 - a. Plantation year: 2009 – Total Area: 528.29 ha
3. Caobas - The plantations of this property included in the project activity are:⁶:
 - a. Plantation year: 2010 – Total Area: 231.10 ha
 - b. Plantation year: 2011 – Total Area: 78.52 ha
 - c. Plantation year: 2011 – Total Area: 424.42 ha
 - d. Plantation year: 2012 – Total Area: 167.33 ha
4. Cedros - Part of Caobas (considered the value in Caobas Plantation)
5. Brasiles – Part of Caobas (considered the value in Caobas Plantation)
6. Amapas – Part of Caobas (considered the value in Caobas Plantation)
7. San Pablo - The plantations of this property included in the project activity are:
 - a. Plantation year: 2010 – Total Area: 168.94 ha
 - b. Plantation year: 2011 – Total Area: 8.06 ha
8. Santa Rosa - The plantations of this property included in the project activity are:
 - a. Plantation year: 2010 – Total Area: 93.00 ha

⁶ The Caobas property is constituted in Brasiles, Amapas , Cedros y Caobas.



Figure 4. Tintal, Pocitos, Caobas, San Pablo and Santa Rosa properties.

The next figure shows the information of the following properties:

1. El Diamante – The plantations of this property included in the project activity are:
 - a. Plantation year: 2011 – Total Area: 33.90 ha
 - b. Plantation year: 2012 – Total Area: 22.00 ha
2. Don Justi – The plantation of this property included in the project activity is:
 - a. Plantation year: 2011 – Total Area: 67.00 ha

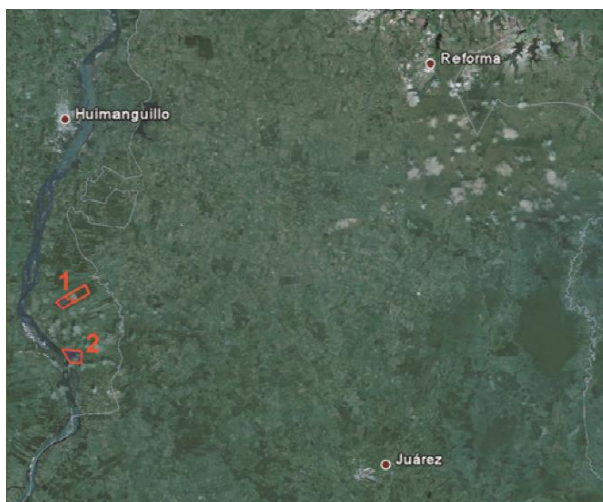


Figure 5. Diamante and Don Justi properties.

The next figure shows the information of the following properties:

1. Cuvadonga – The plantations of this property included in the project activity are:
 - a. Plantation year: 2011 – Total Area: 40.00 ha
 - b. Plantation year: 2012 – Total Area: 113.00 ha
2. Piedra Santa – The plantations of this property included in the project activity are:
 - a. Plantation year: 2011 – Total Area: 73.98 ha
 - b. Plantation Year: 2013 – Total Area: 160.00 ha

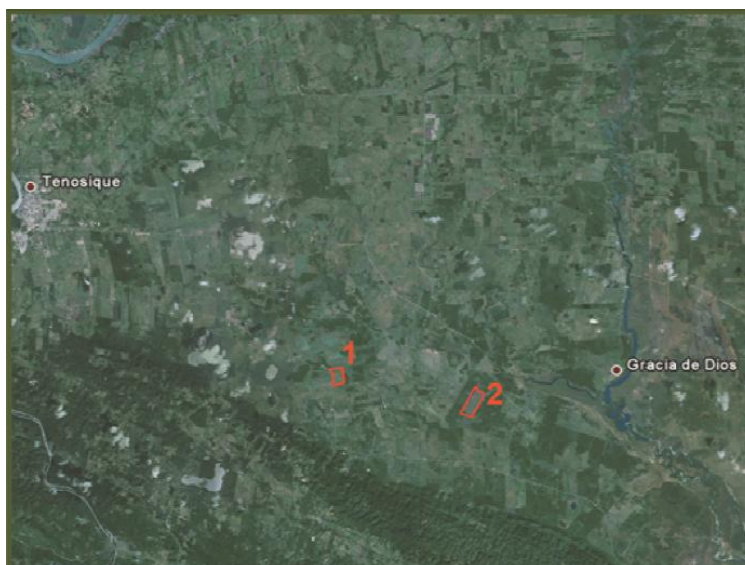


Figure 6. Cuvadonga and Piedra Santa properties.

The next figure shows the information of the following properties:

1. San Juan – The plantation of this property included in the project activity is:
 - a. Plantation year: 2010 – Total Area: 89.11 ha

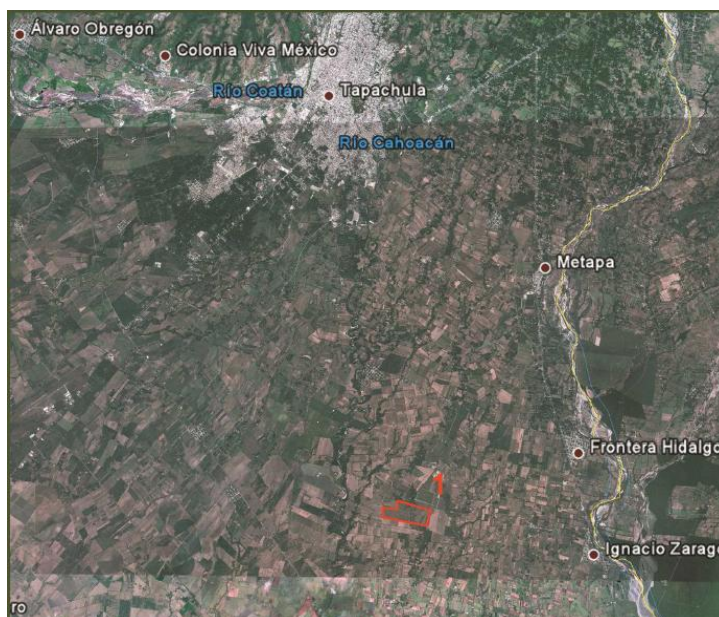


Figure 7. San Juan property.

The next figure shows the information of the following properties:

1. El Rincon – The plantations of this property included in the project activity are:
 - a. Plantation year: 2010 – Total Area: 75.00 ha
2. La Estrella - The plantations of this property included in the project activity are:
 - a. Plantation year: 2010 – Total Area: 40.88 ha
 - b. Plantation year: 2011 – Total Area: 86.29 ha
 - c. Plantation year: 2012 – Total Area: 43.90 ha

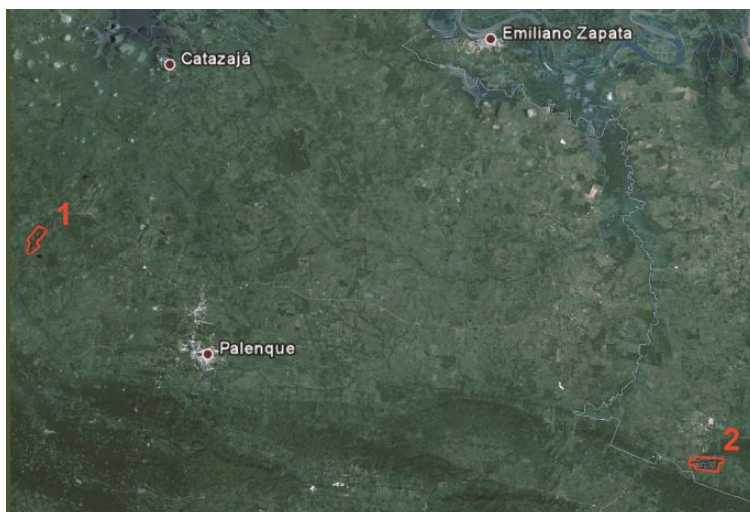


Figure 8. El Rincon and La Estrella properties.

The next figure shows the information of the following properties:

1. San Agustín – The plantations of this property included in the project activity are⁷:
 - a. Plantation year: 2011 – Total Area: 54.86 ha
 - b. Plantation year: 2013 – Total Area: 5.00 ha
2. Nueva Pezuña - The plantation of this property included in the project activity is:
 - a. Plantation year: 2011 – Total Area: 18.47 ha
3. El Milagro - The plantations of this property included in the project activity are:
 - a. Plantation year: 2011 – Total Area: 96.00 ha
 - b. Plantation year: 2013 – Total Area: 5.00 ha

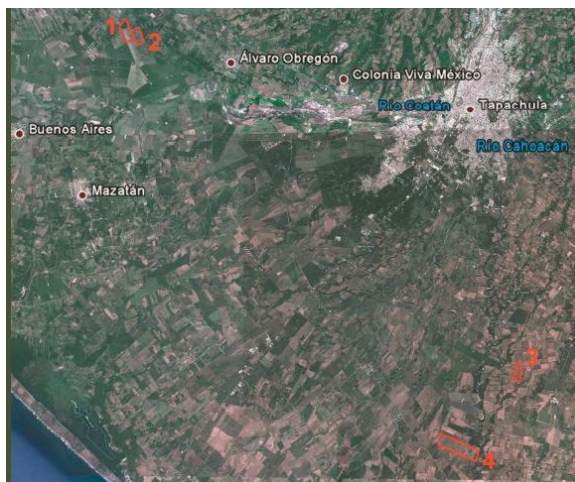


Figure 9. San Agustín, Nueva Pezuña and El Milagro properties.

Other plantations:

- El Porvenir
 - Plantation year: 2012 – Plantation Area: 53.65 ha
- La Laguna
 - Plantation year: 2012 – Plantation Area: 367.50 ha
- El Abuelo
 - Plantation year: 2012 – Plantation Area: 84.06 ha

⁷ The San Agustín property is constituted of El Primor and San Agustín.

- Plantation year: 2013 – Plantation Area: 350.00 ha
- El Establo
 - Plantation year: 2013 – Plantation Area: 35.00 ha.
- El Zombie
 - Plantation year 2013 – Plantation Area: 151.50 ha
- Capri
 - Plantation year 2013 – Plantation Area: 13.50 ha

The following table summarizes the localization of each of the properties mentioned in this section.

Property name	Municipality	State	Latitude Coordinates	Longitude Coordinates
Capitán	Ruiz	Nayarit	21°54'17.2565"-21°55'21.5073"	105°03'17.0963"-105°02'28.0062"
Cascada	Tepic	Nayarit	21°38'49.1112"-21°42'03.0225"	105°03'25.6161"-105°01'49.1458"
Cuvadonga	Tenosique	Tabasco	17°22'56.0356"-17°53'55.9316"	91°17'44.1994" - 91°16' 18.3666"
Don Justi	Huimanguillo	Tabasco	17°40'37.0655"-17°41'07.7419"	93°23'35.8057"-93°22'50.4187"
Diamante	Huimanguillo	Tabasco	17°42'44.5892"-17°43'17.5565"	93°23'51.2254"-93°22'59.6898"
El Milagro	Tapachula	Chiapas	14°44'26.8438" - 14°45'11.7028"	92°16'52.6361"- 92°15'43.2899"
El Rincon	Palenque	Chiapas	17°35'58.2534"-17°36'04.2561"	91°67'20.0981"-92°06'25.8007"
Empeño 8	Tepic	Nayarit	21°38'43.3131"-21°39'51.2910"	105°05'02.3323"-105°03'51.7371"
La Estrella	Palenque	Chiapas	17°25'20.6780"-17°25'59.3793"	91°36'33.3775"-91°35'08.3561"
La Nueva Pezuña	Tapachula	Chiapas	14°46'38.7759" - 14°47'04.3799"	92°14'46.1324" - 92°14'33.0988"
Las Caobas	Balancan	Tabasco	17°50'49.5002"-17°52'18.9842"	91°19'21.9424"-91°18'29.1293"
Los Cedros (Part of Caobas)	Balancan	Tabasco	17°50'17.9392" - 17°50'49.9673"	91°18'39.4440" - 91°18'04.3277"
Los Brasiles (Part of Caobas)	Balancan	Tabasco	17°49'26.9733" - 17°50'48.9856"	91°19'14.0551"-91°18'03.6577"
Las Amapas (Part of Caobas)	Balancan	Tabasco	17°48'35.9505"-17°49'45.5614"	91°19'57.4902"-91°18'04.2594"
Piedra Santa	Tenosique	Tabasco	17°22'03.8508"-17°23'50.7209"	91°13'25.5748"-91°11'13.4305"
Pocito	Balancan	Tabasco	17°51'55.8142"-17°53'01.3608"	91°16'40.4222"-91°14'54.8428"
San Agustín	Tapachula	Chiapas	14°44'26.8438"-14°45'11.7028"	92°16'52.6361"-92°15'43.2899"
Primor (Part of San Agustín)	Tapachula	Chiapas	14°55'52.8174"- 14°56'30.3493"	92°25'51.6704"- 92°25'27.6366"
San Juan	Frontera Hidalgo	Chiapas	14°45'02.2866"-14°45'32.2536"	92°14'49.6422"-92°13'47.7973"
San Pablo	Balancan	Tabasco	17°48'00.8786"-17°49'02.0946"	91°20'04.4037"-91°18'55.7802"
Santa Rosa	Balancan	Tabasco	17°43'24.5522"-17°44'00.4863"	91°29'41.0416"-91°29'05.6074"
Tintal	Balancan	Tabasco	17°53'56.8192"-17°53'01.3608"	91°16'40.4222"-91°14'54.8428"
Victoria 7	San Blas	Nayarit	21°38'26.7938"-21°39'05.3962"	105°09'59.3570"-105°09'31.9502"
El Porvenir	Tenosique	Tabasco	17°23'0.0390"- 17°23'30.0710"	91°17'12.3080"- 91°16'18.8130"
La Laguna	Huimanguillo	Tabasco	17°47'56.8660" - 17°50'5.4220"	93°46'24.2140" - 93°45'8.4370"
El Abuelo	Huimanguillo	Tabasco	17°48'21.6400" - 17°49'58.6030"	93°44'39.5000" - 93°43'26.1820"
El Zombie	Ostuacan	Chiapas	17°32'17.5980" - 17°33'32.6600"	93°27'5.3280" - 93°26'25.4580"
El Establo	Tapachula	Chiapas	14°44'17.4130"- 14°44'44.2860"	92°16'34.8700" - 92°15'51.6800"
El Capri	Huimanguillo	Tabasco	17°42'55.885" – 17°43'11.099"	93°23'3.193" – 93°22'42.865"

Table 4. Indicators for identification of all project properties.

In general terms, all the plantations (with the exception of Cascada and Empeño 8 plantations) are property of Proteak UNO S.A.B. de C.V.

The case of the Cascada and Empeño 8 have a rent contract, however the PP is the process to perform the total land purchase. The DOE can be seen through rental contracts, landlord's commitment to pursue the matter by the Agrarian Law for the sale of land.

In the case of the new plantations, Proteak UNO S.A.B. de C.V. expects to be the owner of the lands, According to the current land management policies of Proteak UNO S.A.B. de C.V., the lands will be bought one year before the expected plantation year.

1.10 Conditions Prior to Project Initiation

CLIMATE

Tepic, Nayarit⁸ – The range of temperature during the year may vary from 16°C until 28°C. The weather is semiwarm subhumid with rain in summer and higher humidity (25.56%), warm subhumid with rain in summer and higher humidity (24.26%), warm subhumid with rain in summer and lower humidity (24.20%), warm subhumid with rain in summer and medium humidity (8.06%), temperate subhumid with rain in summer and higher humidity (0.42%) and warm subhumid with rain in summer and lower humidity (0.25%). The rainfall during the year ranges from 800 mm until 2000 mm.

Ruiz, Nayarit⁹ – The range of temperature during the year may vary from 20°C until 28°C. The weather is warm subhumid with rain in summer and higher humidity (76.73%), warm humid with constant heavy rain in summer (14.32%), semiwarm subhumid with rain in summer and higher humidity (7.69%) and warm subhumid with rain in summer and medium humidity (1.26%). The rainfall during the year ranges from 1000 mm until 2500 mm.

San Blas, Nayarit¹⁰ – The range of temperature during the year may vary from 22°C until 28°C. The weather is warm subhumid with rain in summer and higher humidity (52.83%) and warm subhumid with rain in summer and medium humidity (47.17%). The rainfall during the year ranges from 1300 mm until 2000 mm.

Tenosique, Tabasco¹¹ – The range of temperature during the year may vary from 24°C until 28°C. The weather is warm humid with constant heavy rain in summer (79.23%) and warm humid with rain during the whole year (20.77%). The rainfall during the year ranges from 1500 mm until 2500 mm.

Huimanguillo, Tabasco¹² – The range of temperature during the year may vary from 22°C until 28°C. The weather is warm subhumid with constant heavy rain in summer (59,98%) and warm

⁸ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos.. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/18/18017.pdf>

⁹ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/18/18011.pdf>

¹⁰ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/18/18012.pdf>

¹¹ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/27/27017.pdf>

¹² INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/27/27008.pdf>

humid with rain the whole year (40.11%). The rainfall during the year ranges from 2000 mm until 3500 mm.

Balancan, Tabasco¹³ – The range of temperature during the year may vary from 26°C until 28°C. The weather is warmhumid with constant heavy rain in summer (69.68%) and warm subhumid with rain in summer (30.32%). The rainfall during the year ranges from 1500 mm until 2500 mm.

Palenque, Chiapas¹⁴ – The range of temperature during the year may vary from 22°C until 28°C. The weather is warm humid with rain the whole year (94.62%) and warm humid with constant heavy rain in summer (5.38%). The rainfall during the year ranges from 1500 mm until 4500 mm.

Tapachula, Chiapas¹⁵ – The range of temperature during the year may vary from 14°C until 30°C. The weather is warm humid with constant heavy rain in summer (40.24%), warm subhumid with rain in summer and medium humidity (30.82%), warm subhumid with rain in summer and higher humidity (17.2%), semiwarm humid with constant heavy rain in summer (6.49%) and temperate humid with constant heavy rain in summer (5.25%). The rainfall during the year ranges from 1000 mm until 5000 mm.

Frontera Hidalgo, Chiapas¹⁶ – The range of temperature during the year may vary from 26°C until 30°C. The weather is warm subhumid with rain in summer and higher humidity (52.68%) and warm subhumid with rain in summer and medium humidity (47.32%). The rainfall during the year ranges from 1200 mm until 2500 mm.

Ostuacán, Chiapas¹⁷ -The range of temperature during the year may vary from 22°C until 26°C. The weather is humid with rain all year (100%). The rainfall during the year ranges from 2500 mm until 4500 mm.

HIDROLOGY

Tepic, Nayarit – Is located in the Lerma- Santiago (79.11%) and Hicicila (20.89%) hydrologic regions. The river basins located in this municipality are Santiago-Aguamilpa (79.09%), Huicila - San Blas (20.89%) and Huaynamota (0.02%). The principal body waterbodies are Río Grande de Santiago, San Rafael, Aguamilpa, Amado Nervo, Lagoon de Mora and Francisco Severo Maldonado.

Ruiz, Nayarit – Is located in the Presido- San Pedro (87.62%) and Lerma-Santiago (12.39%) hydrologic regions. The river basins located in this municipality are San Pedro (87.62%) and Santiago-Aguamilpa (12.38%). The principal waterbodies are Los Arroceros and Los Camarones.

San Blas, Nayarit – Is located in the Huicicila (94.37%) and Lerma-Santiago (5.63%) hydrologic regions. The river basins located in this municipality are Huicila- San Blas (94.37%) and Santiago-Aguamilpa (5.63%). The principal waterbodies are estuary El Conchal, lagoon El Camalote, lagoon El Rey, El Pozo, Pericos and River Grande de Santiago.

¹³ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/27/27001.pdf>

¹⁴ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/07/07065.pdf>

¹⁵ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/07/07089.pdf>

¹⁶ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/07/07035.pdf>

¹⁷ INEGI. Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Available at: <http://www3.inegi.org.mx/sistemas/mexicocifras/datos-geograficos/07/07062.pdf>

Tenosique, Tabasco – Is located in the Grijalva- Usumacinta (100%) hydrologic region. The river basins located in this municipality are Grijalva –Villahermosa (72.72%) y Usumacinta (27.28%). The principal water bodies are Lagoon Grande, Lagoon Chica, Estapilla, Lake Seco, San Martín, Pictún, Lagoon Cobó, Santa Cruz, El Maí, El Copo, Lagoon Canitzán, Ensenada Grande.

Huimanguillo, Tabasco – Is located in the Coatzacoalcos (86.61%) and Grijalva-Usumacinta (13.39%) hydrologic regions. The river basins located in this municipality are R. Tonala and L. del Carmen and Machona (86.61%) and R. Grijalva- Villahermosa (13.39%). The principal water bodies are El Rosario, El Potrero, Pantanosa, Las flores and Lagoon Yucateco.

Balancan, Tabasco – Is located in the Grijalva- Usumacinta (100%) hydrologic region. The river basins located in this municipality are Usumacinta (48.29%), L. de Términos (27.09%) and Grijalva-Villahermosa (24.62%). The principal water bodies are Las Piedritas, El Desafío, Ballina, El Guao, Leona Vicario, el Chinal, La Perdida, El Guanaj, San Juan, El susil, Lingle, Lagoon Negra y Multé.

Palenque, Chiapas – Is located in the Grijalva- Usumacinta (100%) hydrologic region. The river basins located in this municipality are Grijalva- Villahermosa (59.43%) and Usumacinta (40.57%). The water bodies are Lagoon Medellín, Lagoon Agua fría, Lagoon Amarilla, Lagoon Nueva Esperanza, Lagoon Obscura, Lagoon San Juan and Lagoon Tintillo.

Tapachula, Chiapas – Is located in the Chiapas coast (100%) hydrologic region. The river basins located in this municipality are Suchiate (95.5%) and Huixtla (4.5%). The water bodies are Juan Manuel, Cocosushate and Salitre.

Frontera Hidalgo, Chiapas – Is located in the Chiapas coast (100%) hydrologic region. The river basin located in this municipality is Suchiate. There are no water bodies.

Ostuacán, Chiapas - Is located in Grijalva-Usumacinta (100%) hydrologic region. The river basin located in this municipality is R. Grijalva - Villahermosa (100%). The main water body is Presa Peñitas.

USE OF SOIL

Tepic, Nayarit – The soil in this municipality is used 22.87% for agriculture, 3.22% as urban area, 32.14% is jungle, 21.54% is forest and 17.88% is grassland.

Ruiz, Nayarit – The soil in this municipality is used 11.64% for agriculture, 1.65% as urban area, 62.19% is jungle, 13.98% is forest and 10.13% is grassland.

San Blas, Nayarit – The soil in this municipality is used 49.6% for agriculture, 1.18% as urban area, 22.3% is jungle, 15.71% is wetland, 5.46% is forest, 2.83% is grassland and 1.05% is underwater.

Tenosique, Tabasco – The soil in this municipality is used 62.15% for cultivated grassland, 7.02% for agriculture, 0.24% as urban area, 23.1% is jungle and 4.32% is tular.

Huimanguillo, Tabasco – The soil in this municipality is used 43.06% for agriculture, 32.48% for cultivated grassland, 0.35% for cultivated forest, 0.56% as urban area, 9.36% is jungle, 4.67% is tular, 4.48% is savannah, 2.34% is popal and 0.63% is wetland.

Balancan, Tabasco – The soil in this municipality is used 72.19% for cultivated grassland, 7.4% for agriculture, 0.36% as urban area, 0.06% for cultivated forest, 7.88% is jungle, 5.22% is forest, 3.53% is tular, 1.09% is inducted grassland and 0.11% is savannah.

Palenque, Chiapas – The soil in this municipality is used 54.52% for cultivated grassland, 0.22% for agriculture, 0.58% as urban area, 39.48% is jungle, 3.26% is savannah, 1% is tular, 0.28% is induced grassland and 0.02% is forest.

Tapachula, Chiapas – The soil in this municipality is used 67.13% for agriculture, 15.7% for cultivated grassland, 5.76% as urban area, 7.88% is forest, 3.2% is wetland, 0.12% is induced grassland, 0.12% is area without vegetation and 0.01% is tular.

Frontera Hidalgo, Chiapas – The soil in this municipality is used 64.71% for agriculture, 33.94% for cultivated grassland, and 1.35% as urban area.

Ostuacan, Chiapas – The soil in this municipality is used 64.19% as cultivated grassland, 6.06% for agriculture, 0.24% as urban area, 21.07% is jungle and 2.18% is area without vegetation.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

In Mexico, the regulation related to forest projects is the General Law for Sustainable Forest Development “Ley General del Desarrollo Forestal Sustentable”, which aims to regulate and promote the conservation, protection, restoration, production, management, cultivation and use of forest ecosystems and their resources in the country. The national institution in charge of the approval of the project activity is the Ministry of Environment and Natural Resources (SEMARNAT).

It is important to state that in the Article 87 and 89 of the General Law is stated that for the forestall plantations with a surface equal or less that 800 hectares, is not necessary to develop an environmental impact assessment, the project developer only needs to submit a written notice for forest planting, then SEMARNAT will issue a proof of registration.

The project activity complies with the General Law for Sustainable Forest Development and binding regulations, this statement is evidence with the Proof of Registration of Commercial Forest Plantation emitted by SEMARNAT. Each property has a proof of registration:

- Capitán property: 138.01.01/0596/09
- Cascada property: 138.01.01/1763/10
- Cuvadonga property: SEMARNAT/SGPARN/147/2472/2011
- Don Justi property: SEMARNAT/SGPARN/147/1544/2011
- El Abuelo property: SEMARNAT/SGPARN/147/0112/2013
- El Caprí property: SEMARNAT/SGPARN/147/1327/2013
- El Diamante property: SEMARNAT/SGPARN/147/2471/2011
- El Establo property: 11868
- El Milagro property: DF/SGPA/UARRN/4580/2011
- El Porvenir property: SEMARNAT/SGPARN/14/2215/2012
- El Rincon property: DF/SGPA/UARRN/3265/2010
- Empeño 8 property: 138.01.01/1763/10
- La Estrella property: DF/SGPA/UARRN/2965/2010
- La Laguna property: SEMARNAT/SGPARN/147/2214/2012
- La Nueva Pezuña property: DF/SGPA/UARRN/5074/2011
- Las Caobas property: Caobas is divided in several properties
 - Caobas: SEMARNAT/SGPARN/147/3213/2010
 - Amapas: SEMARNAT/SGPARN/147/0675/2011
 - Brasiles: SEMARNAT/SGPARN/147/0769/2011
 - Los Cedros: SEMARNAT/SGPARN/147/1542/2011
- Piedra Santa property: SEMARNAT/SGPARN/147/1543/2011
- Pocito property: SEMARNAT/SGPARN/147/1662/2009
- San Agustín property: San Agustín is divided in several properties

- San Agustín: DF/SGPA/UARRN/5073/2011
- Primor: DF/SGPA/UARRN/4581/2011
- San Juan property: DF/SGPA/UARRN/3085/2010
- San Pablo property: SEMARNAT/SGPARN/147/3653/2010
- Santa Rosa property: SEMARNAT/SGPARN/147/2281/2010
- Tintal property: SEMARNAT/SGAPARN/147/1661/2009
- Victoria 7 property: 138.01.01/0771/10

The plantations of Zombie and Establo are in process to obtain the SEMARNAT registry. Number 07/BL-0194/11/13 (Zombie) and 07/BL-0195/11/13 (Establo)

The Forest Stewardship Council (FSC) is an international organization that promotes forest management, among other activities, through a voluntary accreditation program for certifying forest products. This organization evaluates, accredits and monitors the certifiers based on the principles and criteria established by the FSC. In addition, the FSC encourages the establishment of national and regional standards of forest management.

Founded in 1993, the FSC is a non-governmental, independent and nonprofit organization. Its members are representatives from environmental and social groups, wholesalers of timber and forest products, indigenous peoples' organizations, community groups and forest products organizations from all around the world. The FSC system is currently the only eco-label, internationally validated, which allows certification of forest products in the market.

This project activity is FSC certified; this certificate was obtained on December 26, 2006 with the reference code SW-FM/COC-002110. Even though this certificate was valid through December 11, 2011, Proteak UNO S.A.B. de C.V. already submitted the renewal application and the forestry audit has been completed, the new certificate is valid from December 11, 2013 to December 10, 2018 with the code SCS-FM/COC-004302.

It's important to state that not all the plantations are included with this FSC certificate; therefore, this asseveration will affect the risk analysis calculation, which is shown in the Annex A.

In summary, the project activity complies with the General Law for Sustainable Forest Development and binding regulations, the approval of the project by the Ministry of Environment and Natural Resources (SEMARNAT) ensures that the project activity complies with the General Law for Sustainable Forest Development. Furthermore, it is important to emphasize that the project is FSC (Forest Stewardship Council) certified. This certification guarantees the project complies with all legal regulations and that it is sustainable managed.

1.12 Ownership and Other Programs

1.12.1 Right of Use

Notarial certificates stating the right of use of the land units by the project developer are within project boundaries will be provided.

The Fresh Breeze Afforestation project consists in a grouped project that has a management expansion plan of 1200 hectare until the year 2020. Therefore in the case of the future plantation, Proteak UNO S.A.B. de C.V. shall have the right of use for each new project area before the project verification.

1.12.2 Emissions Trading Programs and Other Binding Limits

GHG removals generated by the project will not be used for compliance with binding limits to GHG emissions since such limits are not enforced in Mexico, and there is no emissions trading program in place in the country.

1.12.3 Other Forms of Environmental Credit

The Fresh Breeze Afforestation project will only generate credits from the storage of carbon in forest pools, and these are claimed only under the VCS program.

The project activity has not received any GHG environmental credit for a related program.

1.12.4 Participation under Other GHG Programs

The Fresh Breeze Afforestation project does not participate in any other GHG program.

1.12.5 Projects Rejected by Other GHG Programs

The Fresh Breeze Afforestation project has never applied neither been rejected by other GHG program.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

Fresh Breeze Afforestation consists in a grouped project.

This project proposes the afforestation of degraded forest areas in the states of Chiapas, Tabasco and Nayarit. Proteak UNO S.A.B. de C.V. aims to have a total project of approximately 15,000 ha with an average expansion of 1,200 hectares/year for the future years. The first project instance for validation (this document) covers an area of 4269.82 ha of degraded forest and is geographically described in section 1.9 and 2.3.3 of this PD. The baseline scenario and demonstration of additionality described in section 2.5 of this document are based on this area, but future project areas will closely resemble this case. Proteak UNO S.A.B. de C.V. will manage the GHG information systems and monitoring of the proposed project in the first project area as well as in future project areas.

All future project instances will conform to the following eligibility criteria:

- All new instances shall lie within Mexico (specifically in the states of Tabasco, Chiapas and Nayarit). As is established in the baseline scenario all the new lands will have the same conditions, which means that the lands have an extensive cattle grazing with no pasture improvement.
- Project activity shall be on degraded lands (determined with applicable CDM tool).
- Project activity shall not be on organic and/or drained soils.
- Project area shall not be a wetland.
- The new plantation shall have the same characteristic of the project activities defined in section 1.8.
- A non-permanence risk buffer assessment shall be performed for each new project area and applied for buffer determination.
- Leakage shall be assessed for each new project area following the applicable CDM tool.
- Proteak UNO S.A.B. de C.V. shall have the right of use for each new project area.
- Shall be managed according to the same sustainability principles as described in this PD.

In summary, according to the VCS Standard due this project consist in a grouped project; the following eligibility criteria shall be included:

- 1) Meet the applicability conditions set out in the methodology and tools applied in this project.
- 2) Use the teak as plantation specie and use the same measure process according this PD.
- 3) Are subject to the baseline scenario determined in the project description, as identified in the section 2.4 of this document. As was stated in the document the new plantations will only take place in the states of Tabasco, Chiapas and Nayarit.
- 4) Have characteristics with respect to additionality that are consistent with the initial plantations of the project activity. That means that the additionally of the project will be as was declared in section 2.5 of this document. The common practice analysis is necessary to be done by the time of the validation of the new plantations, in order to demonstrate that the project activity stills not to be a common practice.

For the inclusion of new project plantations, the new plantations shall:

- 1) Occur within one of the designated geographic areas specified in the project description. That means that will occur only in the states of Tabasco, Chiapas and Nayarit.
- 2) Comply with all the eligibility criteria that were stated in the last paragraph. Partial compliance of the eligibility criteria is insufficient.
- 3) Be included in the monitoring report with the sufficient information (technical and geographic) in compliance with the eligibility criteria.
- 4) Be validated at the time of verification against the applicable set of eligibility criteria.
- 5) Have evidence of right of use, in respect of each project activity instance, held by the project proponent from the respective start date of each project activity instance (ie, the date upon which the project activity instance began reducing or removing GHG emissions).
- 6) Be eligible for crediting from the start date of the instance through to the end of the project crediting period (only). Note that where a new project activity instance starts in a previous verification period, no credit may be claimed for GHG emission reductions or removals generated during a previous verification period and new instances are eligible for crediting from the start of the next verification period.

When a new project plantation will be included in the project activity, all the eligibility conditions will be taking into account by Proteak UNO S.A.B. DE C.V.

Leakage Management

For this type of project activity, leakage will carefully be assessed according to selected methodology as described in section 3.3.

Commercially Sensitive Information

No information has been excluded from the public version of project description. Information that is deemed to be commercially sensitive shall remain public as this information is directly related to project's additionality.

As stated in VCS Standard v3.4 all information related to the determination of baseline scenario and project additionality "shall not be considered to be commercially sensitive and shall be provided in the public versions of the projects documents".

Further Information

N/A

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The CDM consolidated methodology AR-ACM0003: "Afforestation and reforestation of lands except wetlands" v1.0.0 is applied to this project activity.

The following methodological tools, to which the selected methodology refers to, are used:

- "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities" Version 02
- "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities" Version 03
- "Estimation of non-CO2 greenhouse gas (GHG) emissions resulting from burning of biomass attributable to an A/R CDM project activity" Version 04.0.0
- "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity" Version 01
- "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities" Version 1.1
- Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", version 01
- VCS AFOLU Non-Permanence Risk Tool Version 3.2
- "Calculation of the number of sample plots for measurements within A/R CDM project activities" version 02.1.0.

2.2 Applicability of Methodology

This methodology is applicable under the following conditions:

- a) The land subject to the project activity does not fall in wetland category;

It is demonstrated with the Land Use Research that all the plantations of the project activity does not fall in the wetland category, so the project activity is in line with the first applicability condition.

- b) Soil disturbance attributable to the afforestation and reforestation (A/R) clean development mechanism project activity does not cover more than 10 percent of area in each of the following types of land, when these lands are included within the project boundary:
 - i. Land containing organic soils;

No land disturbance will be attributable to the project area as a part of the project activity; the land preparation for the plantation includes digging methods as follows:

- The spacing (not disturbance area) between the trees according Proteak Forestry Management Plan has two scenarios:
 - Lower tree density: 890 trees/ha with and spacing of 3.5 meters (row) and 3.2 meters (columns). The spacing area is 11.2 square meters that means that the spacing area per ha is 9968 square meters (99.68% of not disturbance area).
 - Higher tree density: 1111 trees/ha with and spacing of 3.0 meters (row) and 3.0 meters (columns). The spacing area is 9 square meters that means that the spacing area per ha is 9999 square meters (99.99% of not disturbance area).

With this information the PP demonstrate that the project is in line with the applicability condition.

- ii. Land which, in the baseline, is subject to land-use and management practices and receives inputs listed in appendices 1 and 2 to this methodology.

The appendix 1 doesn't apply to the project activity due to the project activity plantations don't falls in cropland category.

The project activity is taking place in land that doesn't fall in the land management practices and inputs listed in appendix 2 of the methodology.

As for appendix 2, grassland, the project activity is developed in tropical wet areas where grasslands are degraded and no inputs are applied.

The "Tool for the identification of degraded or degrading lands for consideration in implementing A/R CDM project activities" Version 1 has been applied to demonstrate that the lands are degraded or degrading.

Stage 1 of the tool requires the PP to screen the lands of the project to determine whether the area has been classified as "degraded" under any verifiable local, regional, national or international land classification system or credible study produced within the last ten years.

In this case is used the report of SEMARNAT (Ministry of Environment and Natural Resources) report is used; it demonstrates the soil degradation of the country¹⁸. The maps 3-2 (page 118), 3-3 (page 119) and 3-4 (122), show that the regions of the project activity falls in the category of degraded and the cause of the degradation is overgrazing¹⁹.

The project activity also complies with the applicability conditions of the tool contained in the methodology AR-ACM0003 version 1.0.0. In some cases there are tools that don't have any applicability conditions therefore are not described below. In general, the project activity complies with all the applicability conditions of all the tools involved with the methodology AR-ACM0003 version 1.0.0.

Tools applicability conditions related to the project activity

- The tool for "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity" Version 01, mentions that the tool is not applicable if the displacement of agricultural activities attributable to the project activity is expected to cause any drainage of wetlands or peat lands. The project activity does not fall in wetland region; therefore this applicable condition doesn't apply to the project activity.

The tool for "Estimation of non-CO2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" mentions the following applicability condition: Non-CO2 GHG emissions resulting from any occurrence of fire within the project boundary shall be accounted for each incidence of fire which affects an area greater than the minimum threshold area reported by the host Party for the purpose of defining forest, provided that the accumulated area affected by such fires in a given year is $\geq 5\%$ of the project area.

In the case of an incident occurs the previous tool will apply to the emission reductions calculation.

In summary the project activity is in line with the applicability conditions:

- The project does not fall in a wetland category (according the Land Use Research by FSI Servicios Técnicos Forestales y Ambientales).
- The soil disturbance is less than 10% as was demonstrated.
- Additionally, none of the plantations fall in the categories shown in the Table 2 of the methodology.
- The project activity is in line with the applicability conditions of all the tools.

¹⁸ SEMARNAT. Chapter 3. Soil. Available at:
http://app1.semarnat.gob.mx/dgeia/informe_2008_ing/03_suelos/cap3_2.html

¹⁹ SEMARNAT. Oficial Document Chapter 3. Available at:
http://app1.semarnat.gob.mx/dgeia/informe_2008_ing/pdf/cap_3_suelos.pdf

2.3 Project Boundary

Project boundaries include all the areas of Proteak UNO S.A.B. DE C.V. that will be reforested; these areas have been defined based on the methodology criteria.

From the GHG emission sources indicated in the methodology, the next table shows the emission sources.

Source		Gas	Included?	Justification/Explanation
Project	Burning of woody biomass	CO ₂	No	CO ₂ emissions due to burning of biomass are accounted as a change in carbon stock
		CH ₄	Yes	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology. In spite of the information mentioned in the methodology, the project activity doesn't practice the activity of burning the biomass for the site preparation. There for these sources will be neglected.
		N ₂ O	No	Burning of woody biomass for the purpose of site preparation, or as part of forest management, is allowed under this methodology.
		Other	N/A	

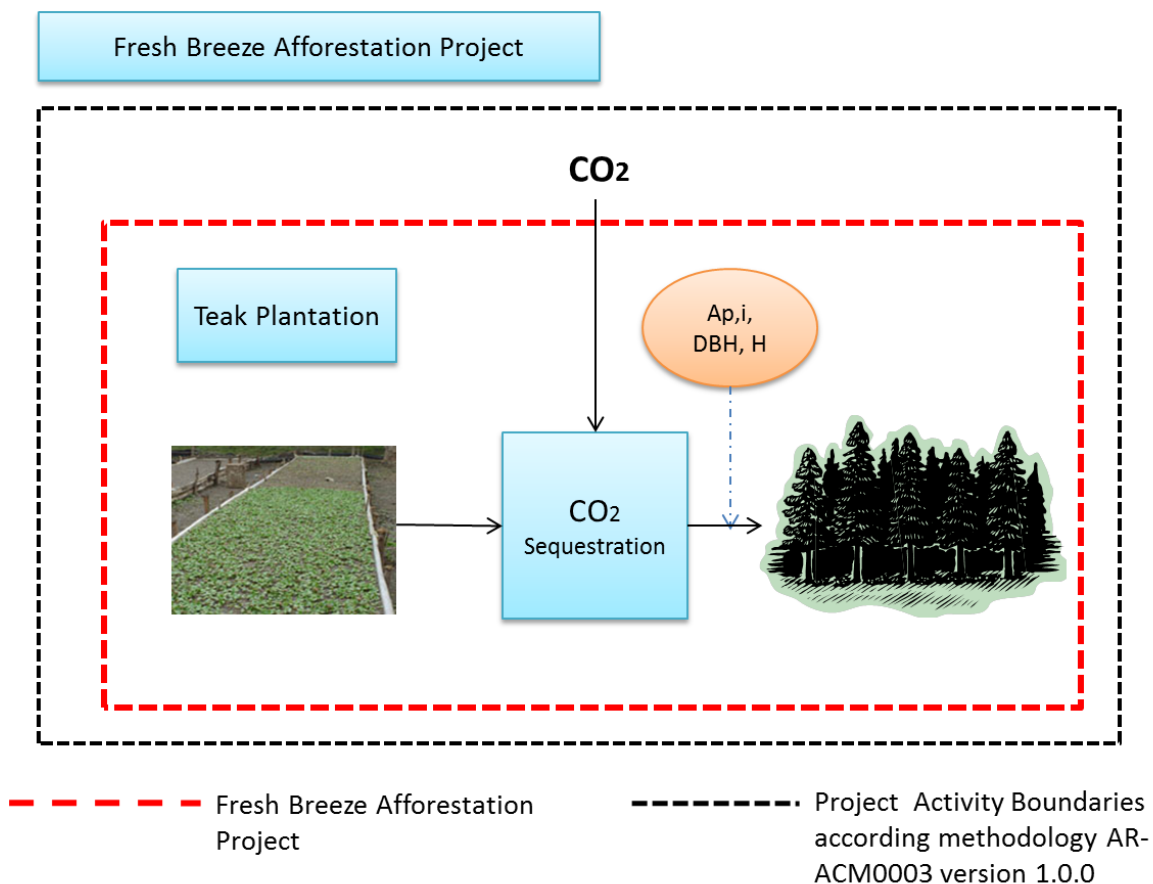


Figure 10. Project Boundary of Fresh Breeze Afforestation Project.

According to the AFOLU Requirement; VCS Version 3.4 is stated the following:

Further, the following GHG Sources may be deemed de *minimis* and need not be accounted for:

- 1) ARR, IFM and REDD: N₂O emissions from project activities that apply nitrogen containing soil amendments and N₂O emissions caused by microbial decompositions of plant materials that fix nitrogen. ALM projects that apply nitrogen fertilizer and/or mature or plant nitrogen fixing species shall account for N₂O Emissions.

Following the AFOLU Requirements, the N₂O is excluded for the GHG emissions calculation.

Regarding CH₄, as demonstrated by the PP through the document “Plan de Manejo de Plantaciones”, site preparation does not require the burning of woody biomass due to the fact that all plantation sites were without inputs and are considered as a degraded lands; therefore these emissions are counted as zero.

Carbon Stock Changes

According to the methodology AR-ACM0003, the selections of carbon pools and greenhouses gases accounted are according the following table:

Carbon pool	Whether selected	Justification/Explanation
Above-ground biomass	Yes	This is the major carbon pool subjected to project activity.
Below- ground biomass	Yes	Carbon stock in this pool is expected to increase due to the implementation of the project activity.
Dead Wood, Litter and Soil organic Carbon	Optional	Carbon stock in these pools may increase due to implementation of the project activity

Table 5. Carbon pools selected for accounting of carbon stock changes.

Shrubs

In the case of the shrubs the AR Methodological tool: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities states the estimation of the shrub biomass per hectare

Shrub biomass per hectare ($B_{SHRUB,i,t}$) is estimated as follows:

- a) For those areas where the shrub crown cover is less than 5 per cent, the shrub biomass per hectare is considered negligible and hence accounts as zero;
- b) For those areas where the shrub crown cover is 5 per cent or more, shrub biomass per hectare is estimated as the equation 35 of the methodological tool.

The Forestry Program of each plantation demonstrates that the plantation were used for cattle activities and that the shrubs appears before the plantation activities as an spontaneous generation or can be founded in isolated places., all evidence were delivered to the verification team.

As complement the photo of each plantation demonstrate that the shrub is not predominant before the project implementation, therefore the carbon stock of shrub in the baseline is neglected. It's complicated to estimate the %shrub after the project implementation, for that reason the PP considers this carbon pool as negligible in order to be conservative no taking into account this carbon pool.

Dead Wood, Litter and Soil Organic

In the case of this carbon pool, the PP uses AFOLU Requirements state that this carbon pool must be considered if the project can reduce this carbon pool significantly, however it is demonstrated that before the project implementation the carbon stock of dead wood and litter is not present in the project baseline scenario. Therefore, the project doesn't reduce this carbon pool.

Therefore the Dead Wood and Litter carbon pool is neglected for the GHG removal calculation.

In other case the Soil Organic is contemplated and used in the GHG removal calculation, the procedure is explained in other section of the document.

2.4 Baseline Scenario

The baseline scenario was defined by using the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities", version 01. Since only one stratum was identified for the baseline scenario, the procedure is only applied once. Following is a description of the application of this tool.

The baseline scenario analysis is made for the three states where the project activity expects to establish all the plantations and all the future plantations, therefore, the baselines scenario is common in all the three states, which means that the analysis and determination of the baseline was made considering the three states.

Step 0. Preliminary screening based on the starting date of the A/R project activity

Timeline of events of the project activity

The following table describes how the project was conceived and the different events that have occurred along the conception of the project. Also it is shows that since the start of the conception, the incentive of the registration of the project as VCS Project Activity was considered.

Year	Event	Support/Reference
April 2008	Consideration of the incentives of VCS.	This is one proposal or communication between, Proteak UNO SAB DE C.V. and a consulting group, that clearly show the evidence that the PP considered the incentives before the start of the project activity.
September 1, 2008	Management decision	This event is supported with an official agreement signed between the investors of the project and Proteak UNO S.A.B. DE C.V. In summary, this agreement declares the necessity of obtaining the carbon credits in order to improve the project capital for the development of the project. This event is considered as the management decision of the project.
July 2009	Starting date of the Project Activity (considering the evidence of the Plantation Tintal which is one of the plantations in the first year of the project activity).	This event is demonstrated with the summary program work that Proteak UNO S.A.B. DE C.V. send to CONAFOR, this document states the area planted and the date when the plantation starts. According to the AFOLU requirements this event is considered as the start date when the project activity leads to the generation of emission reductions or removals are implemented.

Table 6. Timeline of project activity

According to the timeline of the project activity, the consideration of the VCS incentives has been taken into before the starting date of the project activity. Proteak UNO SAB DE C.V. always considered the VCS incentives due to the barriers that the project faces (described en barriers analysis).

Step 1. Identification of alternative scenarios

The following table shows an estimation of the main income activities of the land where the project activity is going to be established. The main activity that preserves in the land is cultivated pasture. This could be evidenced in the validation visit and with some photos of the lands.

Sub-step 1a. Identify credible alternative land use scenarios to the proposed project activity.

1. Continuation of pre-project land use (extensive cattle grazing with no pasture improvement)

Cattle and sheep production has been the traditional rural activity in the project area and in all it surrounding region since the 17th century. In soils of low productivity -like the ones in the project area-, the main products obtained are wool to be sold to textile industry, and calves to be sold for fattening on more fertile soils. A combination of sheep and cattle is the preferred production mix. This production system has remained more or less the same for decades. The main change has been almost the complete displacement of sheep by beef cattle, due to the decline in wool prices during the last 10-15 years.

2. Afforestation

Continuation of the project activity without any incentive from the VCS.

3. Other alternatives

Land used for agricultural practices

The degraded condition of the land would not support agricultural practices. The farmers would not afford the costs for preparation of land for carrying cultivation. The lack of irrigation, lack of proper upkeep and degraded nature of land can reduce the production; therefore the yield will be poor compared to investment.

4. Forestation of at least a part of the land within the project boundary of the proposed project at a rate resulting from:
 - Legal requirements
 - Extrapolation of observed forestation activities in the geographical area with similar socio-economic and ecological conditions to the proposed A/R CDM project activity occurring in a period since 31 December 1989 as selected by the PPs

This option is not applicable to the project activity, actually there not forestation legal requirements by the government or forestation activities in the geographical area. The DOE could validate in the validation visit that the location of the project activities is the unique zones that present forestation activities, the other zones are dedicated to activities such as agriculture or cattle.

Additionally there is not legal requirement by the government to have a forestation activity, the government incentive to forestation activities (such as, promoting reforestation programs or giving trees for reforestation), however there is no law that forces to have forestation activities.

Therefore, this alternative is not applicable and neglected.

Sub-step 1b. Consistency of credible alternative land use scenarios with enforced mandatory applicable laws and regulations

All land use alternatives identified above comply with all mandatory regulations in the country. No alternatives are eliminated based on this criterion.

Step 2. Barrier analysis

Sub-step 2a. Identification of barriers that would prevent the implementation of at least one alternative land use scenarios.

Following is a list of possible barriers for the land-use alternatives identified above:

- Barriers due to local ecological conditions, inter alia:
 - Degraded soil
 - High erosion risk (e.g. steep slopes)

As stated in other section of the document, the evidence of the Ministry of Environment and Natural Resources (SEMARNAT) demonstrate that the lands where the project will be implemented fall in the category of degraded, the evidence of the soil degradation²⁰ are the maps

²⁰ SEMARNAT. Chapter 3. Soil. Available at:
http://app1.semarnat.gob.mx/dgeia/informe_2008_ing/03_suelos/cap3_2.html

3-2 (page 118), 3-3 (page 119) and 3-4 (122), and as mentioned before, the cause of the degradation is the overgrazing²¹.

- Technological barriers
 - Lack of access to necessary materials, for example planting materials;
 - Lack of infrastructure for implementation of the technology.
 - Local communities usually do not have access to quality seed sources and also lack the necessary skills to produce high quality seedlings and to perform successful tree planting especially under drought climatic conditions. In addition they lack the knowledge and experience to prevent planted trees from fire, and attack by pest and disease.

Skilled management and staff is needed (for planning, logistics, thinning, pruning, RIL, and monitoring) to ensure feasible and technically sound management of a sustainable plantation. This can be realized by employing skilled professionals from within and from outside Mexico and constantly training the employees. Building the right set of skills and expertise adds costs and takes time. In the case of Fresh Breeze project, some of the technical experts (including the Forestry Director) are from Venezuela, this demonstrate the low expertise in the country.

The Fresh Breeze project contemplates the use of clone species of Teak, due to the high improvement and performance with the climate conditions of the region. This specie is brought from Proteca, the cost for each effective plantation of this specie is 0.36 USD²², this barrier is related with the last barrier, because the use of a clone specie means that is necessary skilled personal to develop the forestry plantation, personal that is not available in the country.

Sub-step 2b. Elimination of land use scenarios that are prevented by the identified barriers.

Alternative 1

It is not prevented by any barrier. It is the current land use, and the one that has been practiced for more than 100 years.

Alternative 2

Forest plantation is not a common practice in the region. In fact, this production system in terms of local tradition is not well known. This project developer started in the year 2000 as part of the Program of Commercial Forest Plantation that was created in the year 1997²³. In comparison with cattle grazing (more than 100 years from its introduction) is a new form of production. Therefore, knowledge and technology for its implementation is starting to be developed and diffused in the region. There is a noticeable difference between the return periods considered by landowners -who are used to expect a yearly income from their production-, while forestry projects have a period of 10 or more years for return on the investment. In addition, land owners in the region generally lack the capacity and equipment for conducting forestry activities.

This alternative is also prevented by remoteness of land area, which imposes high transportation cost for wood products.

²¹ SEMARNAT. Oficial Document Chapter 3. Available at:
http://app1.semarnat.gob.mx/dgeia/informe_2008_ing/pdf/cap_3_suelos.pdf

²² Agreement between Proteak and Proteca.

²³ CONAFOR. Programa de Desarrollo de Plantaciones Forestales Comerciales. A 15 años de su creación. Page. 3. Available at:
http://www.conafor.gob.mx/biblioteca/documentos/PROGRAMA_DE_DESARROLLO_DE_PFC_A_15_ANOS_D_E_SU_CREACION.PDF

In terms of technology, the adoption of a 25-year rotation imposes uncertainties about wood productivity and quality; wind damages; and harvesting of thick logs, which are additional to other uncertainties applicable to shorter-rotation plantations (e.g., pest and disease outbreaks).

Another uncertainty relates to an eventual increase in the number of trees falling down or being damaged by wind storms. Intensive thinning of *Tectona Grandis* plantations is known to increase the risk of wind damages due to the opening of wide spaces within the forest that may channel the wind and increase its speed, fact that is aggravated by the vulnerability of tall trees. There is no information on an eventual increase in this vulnerability in thinned stands with very tall trees such as those with ages 20 or more, but there have been some cases of plantation losses due to strong wind storms.

Risk of erosion within location area is moderate to high, very steep slopes which could reach 40% result in high vulnerability of soils. Besides, considering the overgrazing history during summers in the region, this alternative is subject to uncertainty about wood productivity due to the degradation process suffered by soils in the project area which, as discussed in the section above about “assessment of applicability conditions”, have lost a fraction of their net primary productivity due to grazing, aggravated by the gully erosion process.

Due to all this barriers, this alternative has been eliminated as baseline scenario.

Alternative 3

As was described in the last sub-step this alternative has been discarded due to the fact that is not profitable; additionally the business core of Proteak UNO S.A.B. de C.V. is not related with this alternative.

Therefore this is not been taking into account in the barrier analysis.

Alternative 4

This alternative is not applicable to the project activity the two conditions that are stated in the tool don't apply to the project activity. The Mexican government don't forces to have forestation activities only promote the forestation activities^{24,25}, and the regions with the same geographical conditions of the project activity are dedicated to different activities that forestation.

Therefore this alternative has been neglected.

Sub-step 2c. Determination of baseline scenario (if allowed by the barrier analysis)

Application of the decision tree of sub-step 2c (considering the outcome of sub-step 2b) leads to the following conclusions:

- Continuation of pre-project activity has been identified as the most plausible scenario in the absence of the proposed project activity.

Following the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” the project has to demonstrate the additionality following the STEP.4 Common Practice Analysis.

²⁴ Procuraduría Federal de Protección del Ambiente. Recursos Naturales. Available at: http://www.profepa.gob.mx/innovaportal/v/1213/1/mx/recursos_naturales.html

²⁵ CONAFOR. Prácticas de Reforestación. Manual Básico. Available at: http://www.conafor.gob.mx/BIBLIOTECA/MANUAL_PRACTICAS_DE_REFORESTACION.PDF

2.5 Additionality

The steps as outlined in the “Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities” version 01 are followed to demonstrate that the proposed project activity is additional. Only step 4 is applied.

Step 4. Common practice analysis

As was stated the grouped project consist in plantations of the states of Tabasco, Nayarit and Chiapas. According to the evaluation of Proteak UNO S.A.B. de C.V. the next plantations will be placed in these three states. Therefore, the common practice analysis needs to be only for these states.

However, in order to be conservative, the PP demonstrated that the project activity is not a common practice in all Mexico country. It is clear that if the common practice analysis is made only for the states of Chiapas, Tabasco and Nayarit, the project activity also is not a common practice.

According the National Forestry Commission (CONAFOR)²⁶, the main plantations established in Mexico are the following:

Activities	Area (Ha)	Type of Plant
Forestaciones Operativas de México S.A. de C.V.	14,548	Eucalyptus, E. urophylla and E. grandis
Agropecuaria Santa Genoveva S.A. de C.V.	9,154	Tectona Grandis Y Cedrela odorata
Proteak UNO S.A.B. de C.V.	4,269.82	Tectona Grandis
Asideros Globales Corporativo, S. de R.L. de C.V.	3,742	Jatropha curcas
Promotora de Plantaciones del Sureste S.A. de C.V.	2,616	Cedrela odorata, Gmelina arbore and Swietenia macrophylla
Plantaciones de Tehuantepec S.A.	2,581	Eucalyptus urophylla and E. Grandis
Gerardo Dávila Rodríguez	2,572	Christmas Tree and Euphorbia antisiphilitica
Forestales Mexicanos, S.A. de C.V.	2,398	Hevea brasiliensis, Eucalyptus urophylla and Eucalyptus spp
Agroindustrial Agua Fría, S.P.R de R.L. de C.V.	2,288	Gmelina arbolea, Cedrela adorata y Swietenia macrophylla

²⁶ CONAFOR. Programa de Desarrollo de Plantaciones Forestales Comerciales. A 15 años de su creación. Pages 66-68. Available at:

http://www.conafor.gob.mx/biblioteca/documentos/PROGRAMA_DE_DESARROLLO_DE_PFC_A_15_ANOS_D_E_SU_CREACION.PDF

Unión de Silvicultores de la Región de Escárcega, S.P.R. de R.L.	2,191	Cedrela odorata y Swietenia macrophylla
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Table 7. Project plantations in México

According to the Combined Tool, the common practice analysis must be done with similar forestation activities which are defined with forestry activities of similar scale or comparable environment. In this case there will be an exhaustive analysis of each plantations of the Table 7, basically for specie there is a highest variation in the management plan, harvest years and rotations.

Forestaciones Operativas de México S.A. de C.V.

The plantation specie is Eucalyptus, E. urophylla and E. grandis.

Compared this project with Fresh Breeze project, the species used are different than Tectona Grandis, the variation of the specie differ in other different factors that will be explained.

Eucalyptus (there are differences between the specie, however the reference reveals information for general eucalyptus species, which is useful to compare with Teak characteristics)²⁷

Site preparation

Eucalypt is very sensitive to competition from all types of weeds in the early years. It is therefore essential to prepare planting sites properly using one of the following methods

- Complete ploughing, carried out and completed during the dry season
- Strip ploughing done during the dry season
- When pitting on stony or sloppy sites, pits should be centered in well cultivated and cleaned patches of at least one meter diameter; and
- On grassland sites, pitting or trenching should be carried out if it is not possible to prepare the planting site by methods (i) and (ii) above.

Planting and Thinning program depending of the ending product

Management objective	Spacement (m)	Thinning	Harvesting age (years)	Rotation
Transmission poles	2.5 by 2.5	Thinning not necessary, coppice management required	3-4	5
Pulp	2.5 by 2.75	Coppice management is necessary	8	3
Plywood	2.75 by 2.75	Thinning not necessary, coppice management required late	30	1
Fibre-board	2.5 by 2.5	Thinning not necessary, coppice management required late	8	3
Charcoal	2.0 by 2.0	Coppice	6-8	4

²⁷Kenya Forest Service. A Guide on to On-Farm Eucalyptus Growing in Kenya. Available at: <http://www.kenyaforestservice.org/documents/Eucalyptus%20guidelines%20%20Final%202.pdf>

		management is necessary		
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Table 8. General Characteristics of Eucalyptus

In conclusion the project of Forestaciones Operativas de México S.A. de C.V. has a significant difference in the specie used against Fresh Breeze project (Eucalyptus against Teak). As is demonstrated with the last information the Eucalyptus is specie with a rotation period shorter than the Teak (about 8 years of Eucalyptus against 25 years of the Teak). That means that the project of Forestaciones Operativas de México S.A. de C.V. has a faster economic return compared with Proteak, this is the main reason that why this project is not similar to the project activity.

Agropecuaria de Santa Genoveva S.A. de C.V.

The plantation specie is Cedrela Odorata and Tectona Grandis

This is the only project that has the same specie as this project activity; however, the project also is constituted with Cedrela Odorata.

The timber is famous for its use in making cigar boxes and it is also used for musical instruments, light construction, veneer, and plywood. The insect repellent smell makes it suitable for wardrobes. In cocoa and coffee plantations it is planted for shade and as a windbreak²⁸.

The Cedrela Odorata has a harvesting age of 18-20 years, the thinning program varies depending the species and the location however it is founded that the specie has at least three periods between the 6,10 and 14 years²⁹.

The project of Agropecuaria de Santa Genoveva S.A. de C.V. taking about the specie is most the same as Fresh Breeze project activity (Both uses Teak). However, the main difference of this project is the type of project; there is attached the project description published in SEMARNAT webpage (National Environmental Agency) that declares that the project of Agropecuaria Santa Genoveva is defined as agricultural, livestock and forestry project³⁰. That means that the project not only depends of the forestry activities, this project has other economic benefits that can help to obtain an economic return (since the first year of operations).

The page 8 of the document shows the schedule of activities, which can demonstrate since the first stages the project is based in other activities to obtain and economic return because they contemplate at least 15 years to obtain an economic return from the forestry activities (since 2001-2016)

In summary the schedule of the project is:

- First 2 years (2001-2003)
 - Agricultural Production (Cassava-Yuka)
 - Improvement cattle breed.
 - Forestry Plantations
- 2003-2005
 - Milk Production
 - Capacitation and Services
- 2005-2006
 - Sale of sexed Semen and / or embryos sexed

²⁸ SEED LEAFLET. Cedrela Odorata L. Available at: http://curis.ku.dk/portal-life/files/20646828/cedrela_odorata_int.pdf

²⁹ Ramírez, Celene. Evaluación del Crecimiento de una Plantación Comercial de Cedro Rojo (Cedrela Odorata L) manejada intensivamente en el sur de Tamaulipas.

³⁰ SINAT.SEMARNAT. Datos Generales del Proyecto Santa Genoveva. Page 2. Available at: <http://sinat.semarnat.gob.mx/dgiraDocs/documentos/camp/estudios/2003/04CA2003A0001.pdf>

- Sales broodstock
- “2016
 - Forestry exploitation.

As it can see it is demonstrated that the project not only depend of the forestry activities (as Proteak), this is the highest difference between the two projects, and the forestry activities have a highest return periods. Additionally, there are recent evidence that Agropecuaria Santa Genoveva continues with this kind of practices, instead of that, they are expanding his sources in other activities (harvest grape), instead the forestry³¹.

In conclusion Agropecuaria Santa Genoveva project has different activities that can alleviate the forestall activity due the highest return periods. This is the highest difference compared to Fresh Breeze project which only depends of the economic returns of the forestry activities. Therefore, this activity is not the same as Fresh Breeze project.

Asideros Globales Corporativo, S. de R.L. de C.V.

The plantation specie is *Jatropha Curcas*

The *Jatropha* is not used for commercial forestry, the main use of *Jatropha* seeds is in the Biodiesel process. The *Jatropha* It is very profitable crop. It can be cultivate in stony, gradient sandy oil and in the land of tiny deepness. The oil extracted from the seeds of *Jatropha* is known as *Jatropha* oil. The oil extracted from the seeds is non-edible and is used in making soaps, cosmetics, colors, candles and wool. The oil cake is used in making plastics and synthetic fibers. *Jatropha* oil characteristics are rich in medicinal properties and are used in treatment of skin-diseases, paralysis, toothache, stomachache etc. Its mixture with cowurine is used as a Bio-Insecticide³².

In conclusion, this project is neglected due to the specie has a different use that a commercial activity. Therefore is clearly a difference between this project and Fresh Breeze project.

Promotora de Plantaciones del Sureste S.A. de C.V.

The species used are *Cedrela odorata*, *Gmelina arbore* and *Swietenia macrophylla*

The information of *Cedrela Odorata* was explained before, in this section will be explained the information of the other two species.

Gmelina Arbore

This is specie with a highest growth, opportunistic in moist forests and is classified as a pioneer of long life. Its capacity is excellent and regrowth buds have a quick and vigorous growth. It is deciduous in the dry areas, measuring up to 30 m in height and has more than 80 cm in diameter. Usually grows with a clear bole of 6-9 m and a conical crown.

The environmental needs of this species are: Life zones in moist forest, temperature of 24-29 °C, preferentially in fertile soils³³.

The wood is used for lumber, farm buildings and general construction, pallets, firewood, furniture, handicrafts, cabinet, paper pulp, plywood, packaging, posts, carpentry, panels and agglomerates.

There is a study that estimates that the rotation age reported for *Gmelina Arbore* varies from the 5 to 12 years³⁴.

³¹ Notimex. Inicia la única cosecha de uva en Norteamérica. Available at: <http://www.zocalo.com.mx/seccion/articulo/inicia-en-mexico-la-unica-cosecha-de-uva-en-norteamerica>

³² Shirke Biofuels, *Jatropha*. Available at: http://www.shirkebiofuels.com/jatropha_plantation_india.htm

³³

There are different thinning program recommended³⁵:

- First Thinning 4 year of age, second thinning at 8 and third thinning at 12.
- First thinning at 6-10 year of age and 8-12 year of age the second thinning.

Swietenia Macrophylla

A swietenia macrophylla plantation system³⁶ is through cleansing strips of 3 m width forest, spaced at 10-12 m between stripes and mahogany along with spacing of 2-5 m is planted.

This species produces a very narrow crown during the early years it takes to close, so is necessary to do regular cleanings at least the first 3-4 years.

In the natural forest trees require 60-100 years to reach marketable size while in plantations can do it in 30-50 years.

This project has several differences compared to Fresh Breeze project activity:

- The total capacity (ha) is almost the half of Fresh Breeze project activity that means that the cost related to the investment and operation and maintenance are reduced by almost the half. Therefore there is a highest difference of the cost between both projects.
- The species are completely different that Teak, that means that the operational practices differ from Fresh Breeze project activity.
- In the case of Cedrela odorata, Gmelina arborea those species has a shorter rotation period compared to the Teak, that means that the project a faster economic returns compared to Fresh Breeze project activity.

In summary, taking into account the above information is demonstrated that the Promotora de Plantaciones del Sureste project is different to Fresh Breeze project.

Plantaciones Tehuantepec S.A.

This project uses Eucalyptus as forestry specie. As was demonstrated above the Eucalyptus has a shorter rotation age, which means in a faster economic return. That's the main difference of Fresh Breeze project.

Gerardo Dávila Rodríguez

The species used are Christmas Tree and Euphorbia Antisyphilitaca.

Christmas tree

Christmas tree needs 10 or 12 years and can be harvested. The Production Process of the Christmas trees is the following³⁷.

These seeds in the future will be Christmas trees are grown in small containers are placed in greenhouses, to care for them closely while they are small until they average 20 inches in height.

³⁴ Roshetjo, James A viable specie for smallholder tree farming in Indonesia?. Available at:

<http://www.worldagroforestry.org/sea/Publications/files/paper/PP0137-05.PDF>

³⁵ FAO Corporate Document Repository. Technical information. Available at:

<http://www.fao.org/docrep/005/y7206e/y7206e06.htm>

³⁶ Swietenia Macrophylla. Available at:

http://herbaria.plants.ox.ac.uk/adc/downloads/capitulos_especies_y_anexos/swietenia_macrophylla.pdf

³⁷ Agros Navidad. Aprende como se siembran los arbolitos Available at:

<http://www.agrosnavidad.com/Default.aspx?tabid=64>

Once they reach this point, a selection of trees that do not have the appropriate properties and it is believed that not become Christmas trees, the elect will be transplanted to plastic bags, and put back for 3 years is more in a greenhouse to care for them and give them the nutrients they need.

Once met this process are brought to the field where they are transplanted at a distance of 2 meters between each tree.

Euphorbia Antisyphilitica

This specie is used to obtain the wax, as the final product. That means that this species is not used as a commercial forest plantation.

This project is neglected for the analysis in the first case the Euphorbia is not used for forestry activities

However, if only analyse Christmas tree could be considered a forestry activities. It is demonstrated that the rotation age of a three is shorter than the rotation year of the Teak, using the same argument before that means that the economic returns are faster compared to Fresh Breeze project activity. Therefore, this project is different than Fresh Breeze project activity.

Forestales Mexicanos, S.A. de C.V.

The plantations used are: Hevea brasiliensis, Eucalyptus urophylla and Eucalyptus spp, in the case of the Eucalyptus species the explanation was given before.

Hevea Brasiliensis

Hevea brasiliensis native of Brazil is a tropical plant of a long pre-production period of 6-7 years and a productive life that reaches 30 to 40 years. While it thrives in a variety of environments, development and optimum performance is obtained on agroecological systems experiencing humid climates and loamy soils deeper than one meter, well-drained with a pH of 4 to 5.9, which is the case and Acrisols Luvisols soils and a slope no greater than 12% to facilitate the work of establishment, maintenance and harvest, therefore, reduce costs.

Pruning

Two types of pruning is performed during the development of the tree;

1. Pruning sprouting: involves the removal of all outbreaks from rootstock used as a standard, mainly during the first 60 days, to facilitate the growth of clonal outbreak; Also, it should be removed from all side shoots for disposal is required every 15 days during the months of August to December 1.

2. Pruning: its purpose is that the plant has a straight trunk, unbranched and uniform development, additionally, when you see the fourth cycle of pruning leaves the second and so on until the plant reaches a height of 1.8 to 2 m., after which the tree is allowed to form normal glass. In years 2, 3 and 4 is required to proceed with pruning training, conducting tours every month for one year.

On average it takes 6-7 years for a plantation trees reach productive development (thinning), however well-cultivated plantation can start producing at 5 years. Rubber trees begin to explode when 60% of them are 45 cm. or more to 1 m circumference. Graft height with a minimum thickness of 6 mm cortex, which means that it is not the age of the tree is taken into account, but the development of it. To find out, from year 4 must take data in circumference.

Compared directly the project Forestales Mexicanos and Fresh Breeze

- The total capacity (ha) is like the half of Fresh Breeze project activity that means that the cost related to the investment and operation and maintenance are reduced by almost the half. Therefore there is a highest difference of the cost between both projects.
- The species are completely different that Teak, that means that the operational practices differ from Fresh Breeze project activity.

- In the case of Eucalyptus those species has a shorter rotation period compared to the Teak, that means that the project a faster economic returns compared to Fresh Breeze project activity.

In summary, it is demonstrated that Forestales Mexicanos project is too different compared with Fresh Breeze project, taking into account the specie (reflected in the rotation period) and the capacity of the project.

Agroindustrial Agua Fría, S.P.R. de R.L. de C.V.

The species planted are Gmelina arbolea, Cedrela odorata y Swietenia Macrophylla. All these species were declared before.

Compared directly the project Agroindustrial and Fresh Breeze

- The total capacity (ha) is like the half of Fresh Breeze project activity that means that the cost related to the investment and operation and maintenance are reduced by almost the half. Therefore there is a highest difference of the cost between both projects.
- The species are completely different that Teak, that means that the operational practices differ from Fresh Breeze project activity.
- In the case of Gmelina arbolea and Cedrela odorata those species has a shorter rotation period compared to the Teak, that means that the project a faster economic returns compared to Fresh Breeze project activity.

In summary, it is demonstrated that Agroindustrial Agua Fría project is too different compared with Fresh Breeze project, taking into account the specie (reflected in the rotation period) and the capacity of the project.

Unión de Silvicultores de la Región de Escárcega, S.P.R. de R.L.

The species planted are Cedrela Adorata, Swietenia Macrophylla. All these species were declared before

Compared directly the project Unión de Silvicultores de la Región de Escárcega and Fresh Breeze

- The total capacity (ha) is like the half of Fresh Breeze project activity that means that the cost related to the investment and operation and maintenance are reduced by almost the half. Therefore there is a highest difference of the cost between both projects.
- The species are completely different that Teak, that means that the operational practices differ from Fresh Breeze project activity.
- In the case of Gmelina arbolea, this species has a shorter rotation period compared to the Teak, that means that the project faster economic returns compared to Fresh Breeze project activity.

In summary, it is demonstrated that Unión de Silvicultores de la Región de Escárcega project is too different compared with Fresh Breeze project, taking into account the specie (reflected in the rotation period) and the capacity of the project.

In conclusion, there are different characteristics that make each project different from Fresh Breeze project, in some case there are some plantation that the main objective is not a forestry activity because the specie used has other benefits. In the companies that have the commercial activity as the main activity there a significant variation between the species, each specie needs to be considered a particular case because as it can see in the last table the variation between the harvest age, thinning, rotation and maintenance (see the description of each specie) demonstrate that each project is completely different.

According to the information is demonstrated that the project activity **is not a common practice**.

As is described before one of the main barriers of Fresh Breeze project activity is that the due the specie used it is necessary the economic returns take too much time, therefore, the incentives of the VCU's obtained due the registration of the project as a VCS project activity will help to alleviate the operation process of the project activity, that means that the VCU's incentives can avoid the barriers that the project has.

2.6 Methodology Deviations

No deviations from the procedures indicated by the methodology have been made.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Since continuation of an activity that has been applied without changes for more than 20 years has been selected as the baseline scenario, it is assumed, in agreement with IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry (2003) that the net GHG removals by sinks in the baseline equals zero.

3.2 Project Emissions

According to the methodology AR-ACM0003 version 01.0.0 is stated that if biomass distribution over the project area is not homogeneous, stratification should be carried out to improve the precision of biomass estimation.

In the case of the project activity there different conditions of the plantations such as the weather conditions (there are variations in the state of Nayarit and Tabasco-Chiapas), the type of seed used (clone seed or normal seed) and the year of plantation. Both variables affect directly the biomass distribution of the project activity, the type of seed and weather conditions are involved in the variable of growth curve.

Therefore, the project activity will be stratified per growth curve and per plantation year. The next table shows the project stratification.

Stratum (i)	Year	Growth Curve	Size (ha)
1	2009	México 2 (México Tabasco)	875.42
2	2009	México 1 (México Nayarit)	62.43
3	2010	México Clon (México Premium)	297.99
4	2010	México 2 (México Tabasco)	400.04
5	2011	México Clon (México Premium)	684.94
6	2011	México 2 (México Tabasco)	296.56
7	2012	México Clon (México Premium)	819.44
8	2012	México 2 (México Tabasco)	113.00
9	2013	México Clon (México Premium)	720.00

Table 9. Project activity stratification.

The actual net GHG removals by sinks shall be calculated as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \quad \text{Equation (1)}$$

Where:

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; tCO_{2-e}

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; tCO_{2-e}

$GHG_{E,t}$ = Increase in non-CO₂ GHG emissions within the project boundary as a result of the implementation of the A/R project activity, in year t , as estimated in the tool "Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; tCO_{2-e}

Estimation of GHG emissions within the project boundary

The increase in GHG emissions as a result of the implementation of the proposed A/R CDM project activity within the project boundary can be estimated as:

$$GHG_E = \sum_{t=1}^{t^*} GHG_{E,t} \quad \text{Equation (2)}$$

Where

GHG_E = Increase in GHG emissions as a result of the implementation of the proposed A/R CDM project activity within the project boundary; t CO_{2-e}

$GHG_{E,t}$ = Increase in non- CO₂ emissions due to burning of biomass of existing woody vegetation as part of site preparation in year t , as estimated in the tool "Estimation of non CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; tCO_{2-e}

t = 1,2,3,... t^* years elapsed since the start of the A/R CDM project activity

As mentioned before Proteak UNO S.A.B. DE C.V. through a document named "Programa de Manejo de Plantación Forestal Simplificado" show the process of land preparation and demonstrates that no biomass is burned during site preparation, so there will be no GHG emissions from biomass burning.

Si $GHG_E = 0$

Change in the carbon stocks in project, occurring in the selected carbon pools in year t shall be calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta SOC_{AL,t} \quad \text{Equation (3)}$$

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t ; tCO_{2-e}

$\Delta C_{TREE_PROJ,t}$ = Change in carbon stock in tree biomass in project in year t , as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; tCO_{2-e}

$\Delta C_{SHRUB_PROJ,t}$ = Change in carbon stock in shrub biomass in project in year t , as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"; tCO_{2-e}

$\Delta C_{DW_PROJ,t}$ = Change in carbon stock in dead wood in project in year t , as estimated in the tool "Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities"; tCO_{2-e}

$\Delta C_{LI_PROJ,t}$ = Change in carbon stock in litter in project in year t , as estimated in the tool “Estimation of carbon stocks due to the implementation of A/R CDM project activities”, as estimated in the same tool; tCO_{2-e}

$\Delta SOC_{AL,t}$ = Change in carbon stock in SOC in project, in year t , in areas of land meeting the applicability conditions of the tool “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities”, as estimated in the same tool; tCO_{2-e}

The baseline net GHG removals by sinks shall be calculated as follows:

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SHRUB_BSL,t} + \Delta C_{DW_BSL,t} + \Delta C_{LI_BSL,t} \quad \text{Equation (4)}$$

Where:

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks in year t ; t CO_{2-e}

$\Delta C_{TREE_BSL,t}$ = Change in carbon stock in baseline tree biomass within the project boundary in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO_{2-e}

$\Delta C_{SHRUB_BSL,t}$ = Change in carbon stock in baseline shrub biomass within the project boundary, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; t CO_{2-e}

$\Delta C_{DW_BSL,t}$ = Change in carbon stock in baseline dead wood biomass within the project boundary, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO_{2-e}

$\Delta C_{LI_BSL,t}$ = Change in carbon stock in baseline litter biomass within the project boundary, in year t , as estimated in the tool “Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities”; t CO_{2-e}

Estimation of tree biomass using the BEF technique.

In this technique volume tables or volume equations are used to convert tree dimensions to stem volume of trees. Stem volume of trees is converted to above-ground tree biomass using density and biomass expansion factors, and the above-ground tree biomass is expanded to total tree biomass using root-shoot ratios. This is estimated as:

$$B_{TREE,j,p,i,t} = V_{TREE,j,p,i,t} \times D_j \times BEF_{2,j} \times (1 + R_j) \quad \text{Equation (5)}$$

Where:

$B_{TREE,j,p,i,t}$ = Biomass of trees of species j in sample plot p of stratum i at a point of time in year t , t dry matter (d.m.)

$V_{TREE,j,p,i,t}$ = Stem volume of trees species j in sample plot p of stratum i at a point of time in year t , estimated by using the tree dimension(s) as entry data into a volume table or volume equation; m³

D_j = Density (overbark) of tree species j ; t.d.m. m⁻³

$BEF_{2,j}$ = Biomass expansion factor for conversion of stem biomass to above-ground tree biomass, for tree species j ; dimensionless

R_j = Root-shoot ratio for tree species j ; dimensionless

j = 1,2,3, Tree species in plot p

p = 1,2,3, Sample plots in stratum i

i = 1,2,3, Tree biomass estimation strata within the project boundary

t = 1,2,3, Years counted from the start of the project activity

In order to determine the change in carbon stocks of the trees it is necessary to determine the change in volume of the trees. The project participant has obtained diameter curves, in order to predict the growth of the tree. The diameter curves are divided in three categories:

- Mexico 1- This curve is applied for the plantations of Nayarit.
- Mexico 2- This curve is applied for the plantations of Tabasco and Chiapas
- Mexico clon- This curve is applied for the clonal plantations, in the emission reduction calculations this curve is described as Mexico Premium.

Curves	Mexico 1	Mexico Clon	Mexico 2
Diameter curves			
Year	IMA 10.17	IMA 17.33	IMA 15.11
1	0.028	0.039	0.037
2	0.054	0.074	0.070
3	0.078	0.107	0.101
4	0.100	0.138	0.130
5	0.121	0.166	0.157
6	0.140	0.192	0.181
7	0.157	0.217	0.204
8	0.174	0.240	0.226
9	0.190	0.261	0.246
10	0.204	0.281	0.265
11	0.218	0.300	0.283
12	0.231	0.318	0.300
13	0.243	0.335	0.316
14	0.255	0.351	0.331
15	0.266	0.366	0.345
16	0.276	0.380	0.359
17	0.286	0.394	0.372
18	0.295	0.407	0.384
19	0.304	0.419	0.395
20	0.313	0.431	0.406
21	0.321	0.442	0.417
22	0.329	0.453	0.427
23	0.336	0.463	0.437
24	0.343	0.473	0.446
25	0.350	0.482	0.455
26	0.357	0.491	0.464
27	0.364	0.501	0.472
28	0.370	0.510	0.481
29	0.377	0.519	0.490
30	0.384	0.529	0.499
31	0.391	0.538	0.508

Table 10. Diameter curves of Proteak's Teak plantations.

Proteak	
Tree Height	
Year	Meters
1	7.50
2	8.00
3	8.75
4	10.00
5	10.00
6	11.25
7	12.50
8	13.38
9	14.25
10	15.00
11	15.17
12	16.17
13	17.17
14	18.17
15	20.00
16	20.98
17	21.91
18	22.79
19	23.60
20	24.29
21	24.85
22	25.29
23	25.66
24	25.98
25	26.23

Table 11. Heigh of Teak plantations.

The calculation of the teak biomass was calculated by the following equations of Petmark and Sahunalu published in the research article of the University in Bangkok³⁸. The equations are the following:

- For Stem biomass (W_S) :

$$\text{Log } W_S = 0.9797 \log (D^2H) - 1.6902; \quad r^2 = 0.9930 \quad \text{Equation (6)}$$
- For Branch biomass (W_B) :

$$\text{Log } W_B = 1.0605 \log (D^2H) - 2.6326; \quad r^2 = 0.9567 \quad \text{Equation (7)}$$
- For Leaf biomass (W_L) :

³⁸ Petsri, S. et al. Aboveground carbon content in mixed deciduous forest and peak plantations. September 2003, page 4

$$\text{Log } W_L = 0.7088 \log (D^2 H) - 1.7383; \quad r^2 = 0.8523 \quad \text{Equation (8)}$$

The sum of each formula will correspond to the mass per three.

Above and below ground biomass have been estimated according to the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activity”. A summary of the main factors used and each source of data are presented in the table below. Estimations are archived as part of the project documentation and will be available for the validation team. Data used for estimating tree biomass are shown in the next table.

Parameter	Symbol	Tectona Grandis	Source
Basic density for teak tree (tonnes dry matter/m ³)	D _{wood,j}	0.5	Obtained from the IPCC. Table 3A.19 (Tectona Grandis). ³⁹
Density of teak calculated with the formula of the tool (tonnes dry matter/m ³)	D _j	0.485	Using the formula of the Methodological tool: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R project activities
Biomass expansion factor (dimensionless)	BEF _{2,j}	1.3	Values from Table 3A.1.10 of IPCC GPG-LULUCF 2003. As the weather of the activity is tropical and is considered a forest type of pines.
Carbon Fraction (dimensionless)	CF	0.47	According the tools, this is the conservative value obtained from the IPCC.
Root-to-shoot ratio (dimensionless)	R _j	0.31	Obtained from the IPCC table 3A.1.8 of IPCC GPG LULUCF 2003. Used the lowest value as a conservative approach.

Table 12. Parameters used for the calculation of stock.

Soil organic carbon

Estimations of soil organic carbon (SOC) stocks were done in accordance to the “Tool for the change in soil organic carbon stocks due to the implementation of A/R CDM project activity”. As suggested by the tool, it is assumed that the implementation of the project activity increases the SOC content of the lands from the pre-project level to the level that is equal to the steady-state SOC content under native vegetation. The increase in SOC content in the project scenario takes place at a constant rate over a period of 20 years from the year of planting.

The project meets the applicability conditions of this tool since:

³⁹ IPCC. Wood density. Table 3A.19. Available at:
http://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf_files/Chp3/Anx_3A_1_Data_Tables.pdf

- The areas of land to where the tool is applied do not fall into wetland category and are not subject to any of the land management practices and application of inputs listed in Tables 1 and 2 of the tool;

The three applicability conditions can be demonstrated with the photos of each plantation, which demonstrate that the lands do not fall in wetland category and that the plantation had no inputs, in the same way the validation team could corroborate in the visit that the plantations follow the applicability conditions of the tool.

Additionally, in this section details the type of land or category that the project plantations fall into, with this it's also demonstrated that the project plantations don't fall in wetland category. The main soils related to the project plantations are: Gleysol, Rendzine, Regosols, Cambisols⁴⁰

In the case of Regosols and Cambisols the tool classifies these soils as High Activity Clay (HAC), in the case of the Gleysol and Rendzine they're considered as land where the clay percentage is 24 and 29%, respectively⁴¹, those lands can be considered as LAC. With this it's demonstrated that the project land do not fall in wetland category.

- Since the land use prior to project start is grassland, only Table 2 applies. For the tropical wet and tropical moist climate region corresponding to the project activity, none of the three combinations included in Table 2 are applicable;
- Litter remains on site and is not removed and soil disturbance is in accordance to appropriate conservation practices, limited to site preparation and not repeated within 20 years.

Parameter	Symbol	Value	Source (SOC estimation tool V01.1.0)
Reference SOC (tC/ha)	$SOC_{REF,i}$	44	Table 3 HAC Soil, Tropical, wet climate which is the most predominant.
Land use factor	$f_{LU,i}$	1	All permanent grassland is assigned a land-use factor of 1
Management	f_{MG}	0.70	As was demonstrated land is considered a degraded land
Input	f_{IN}	1	All grassland without input fertilizers is assigned the input value of 1.

Table 13. Parameters used for the calculation of soil.

SOC at the beginning of the project ($SOC_{INITIAL,i}$) is estimated by multiplying the factors in Table by the reference SOC. As per the tool, a loss in SOC ($SOC_{LOSS,i}$) is applied in the case that soil disturbance occurs on more than 10 per cent of the land area, for the case of the project activity

⁴⁰ INEGI. Instituto Nacional de Estadística y Geografía. Principales Tipos de Suelo. Available at: <http://mapserver.inegi.gob.mx/geografia/espanol/datosgeogra/fisigeo/suelos.cfm>

⁴¹ INEGI. Instituto Nacional de Estadística y Geografía. Perfiles de Suelo. Page 18. Available at: <http://mapserver.inegi.gob.mx/geografia/espanol/prodyserv/prods-geograficos/perfiles/perf.pdf>

this is not the case, therefore $SOC_{LOSS,i}$ is zero. The following methodological formula is used for calculating the annual change in SOC stock

$$dSOC_{t,i} = \frac{SOC_{REF,i} - (SOC_{INITIAL,i} - SOC_{LOSS,i})}{20 \text{ years}}$$

Equation (9)

Where:

- $dSOC_{t,i}$ = The rate of change in SOC stock in stratum i of the area of land, in year t ; tC/ha/year
- $SOC_{REF,i}$ = Reference SOC stock corresponding to the reference condition in native lands by climate region and soil types applicable to stratum i of the area of land; tC/ha
- $SOC_{INITIAL,i}$ = SOC stock at the beginning of the A/R project activity in stratum i of the areas of land
- $SOC_{LOSS,i}$ = Loss of SOC caused by soil disturbance attributable the A/R project activity, in stratum i of the areas of land ; tC/ha

The result of $dSOC_{t,i}$ is 0.66 t C/ha/year, therefore this is the value of the increase of the soil organic carbon.

3.3 Leakage

Leakage shall be estimated as follows:

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

Equation (10)

Where:

- LK_t = GHG emissions due to leakage, in year t ; t CO₂-e
- $LK_{AGRIC,t}$ = Leakage due to the displacement of agricultural activities in year t , estimated in the tool "Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R project activity"; t CO₂-e

The calculation of the leakage emissions is the following equation.

$$LK_{Agriculture,t} = \frac{44}{12} * \frac{f}{T_{cred}} * \Delta C d_t$$

Equation (11)

Where:

- $LK_{Agriculture,t}$ = Leakage due to displacement of agricultural activities in year t (tCO₂-e)
- f = Fraction of land covered by forest (according to the national definition of forest) in the region containing the project activity (dimensionless)
- T_{cred} = Number of year in the first crediting period (dimensionless)
- $\Delta C d_t$ = Sum of annual changes in carbon stock in all selected carbon pools since the start of the project activity to the year of verification t_{ver} attributable to the area subject to pre-project agricultural activities that are displaced during year t since the start of the project activity (t C).
- t = 1,2,3, t year elapsed since the start of the project activity.
- 44/12 = Ratio of molecular weight of CO₂ to carbon (tCO₂-e tC⁻¹)

All the plantations are grassland, therefore these emissions are not considered in the project activity, this assumption is supported with the photo of each plantation

According the AFOLU requirements state that the Methodologies shall establish procedures to quantify all significant sources of leakage. Leakage is defined as any increase in GHG emissions that occur outside the project boundary (but within the same country), and is measurable and attributable to the project activities. All leakage shall be accounted for, in accordance with this Section 4.6. The three types of leakage are:

- 1) Market leakage occurs when projects significantly reduce the production of a commodity causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the lost supply.

The land of the project activity didn't have any forestry/agricultural use before the project activity; therefore, there wasn't any production of a commodity or something that can be involved with the leakage condition.

- 2) Activity-shifting leakage can result from, inter alia, the shifting of grazing animals, shifting of households or communities, shifting of aquacultural or agricultural activities or shifting of fuelwood collection (from non-tree sources). Leakage emissions may also result from transportation and machinery use.

The project activity is not related with the shifting of grazing animals or households or communities, therefore, this condition is neglected.

- 3) Ecological leakage occurs in WRC projects where a project activity causes changes in GHG Emissions or fluxes of GHG emissions from ecosystems that are hydrologically connected to the project area.

The project activity is not involved with a Wetland Restoration and Conservation project; therefore, this leakage is not included.

3.4 Net GHG Emission Reductions and Removals

The net anthropogenic GHG removals by sinks shall be calculated as follows:

$$\Delta C_{AR-CDM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t \quad \text{Equation (12)}$$

Where:

$\Delta C_{AR-CDM,t}$ = Net anthropogenic GHG removals by sinks, in year t ; tCO_{2-e}

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; tCO_{2-e}

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks, in year t ; tCO_{2-e}

LK_t = GHG emissions due to leakage, in year t ; tCO_{2-e}

The actual net GHG removals by sinks shall be calculated as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t} \quad \text{Equation (13)}$$

Where:

$\Delta C_{ACTUAL,t}$ = Actual net GHG removals by sinks, in year t ; t CO_{2-e}

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t, t CO₂-e
 $GHG_{E,t}$ = Increase in non-CO₂ GHG emissions within the project boundary as a result of the implementation of the project activity in year t, as estimated in the tool “Estimation of non-CO₂ GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity”, t CO₂-e,

The change in the carbon stocks in project, occurring in the selected carbon pools in year t shall be calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE_PROJ,t} + \Delta C_{SHRUB_PROJ,t} + \Delta C_{DW_PROJ,t} + \Delta C_{LI_PROJ,t} + \Delta CSOC_{AL,t}$$

Equation (14)

Where:

$\Delta C_{P,t}$ = Change in the carbon stocks in project, occurring in the selected carbon pools, in year t; tCO₂-e.

$\Delta C_{TREE_PROJ,t}$ = Change in carbon stock in tree biomass in project in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; tCO₂-e

$\Delta C_{SHRUB_PROJ,t}$ = Change in carbon stock in shrub biomass in project in year t, as estimated in the tool “Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities”; tCO₂-e

$\Delta C_{DW_PROJ,t}$ = Change in carbon stock in dead wood biomass in project in year t, as estimated in the tool “Estimation of carbon stocks and change in dead wood and litter in A/R CDM project activities”; tCO₂-e

$\Delta C_{LI_PROJ,t}$ = Change in carbon stock in litter in project in year t, as estimated in the tool “Estimation of carbon stocks and change in dead wood and litter in A/R CDM project activities”; tCO₂-e

$\Delta SOC_{AL,t}$ = Change in carbon stock in SOC in project, in year t, in areas of land meeting the applicability conditions of the tool “Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities”, as estimated in the same tool; tCO₂-e

Correction for large maximum allowable relative error.

The maximum allowable relative error of the mean tree biomass is calculated using the following equation:

$$RE_{max} = u_{bTREE,t}$$

Equation (15)

Where:

RE_{max} = Maximum relative error, %

$u_{bTREE,t}$ = Uncertainty of the mean tree carbon per hectare within the project boundary at time t; %.

T = 1, 2, 3 ... years counted from the start of the A/R CDM project activity

The PP demonstrates that the relative error is 1.18%, therefore, since this value is less than 10%, the deduction rate is 0%.

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
Year 1 (1 July 2009-30 June 2010)	0	10,103	0	10,103
Year 2	0	28,791	0	28,791
Year 3	0	62,520	0	62,520
Year 4	0	115,884	0	115,884
Year 5	0	153,444	0	153,444
Year 6	0	231,137	0	231,137
Year 7	0	299,063	0	299,063
Year 8	0	368,540	0	368,540
Year 9	0	394,437	0	394,437
Year 10	0	478,086	0	478,086
Year 11	0	474,160	0	474,160
Year 12	0	477,911	0	477,911
Year 13	0	545,374	0	545,374
Year 14	0	647,236	0	647,236
Year 15	0	785,404	0	785,404
Year 16	0	815,237	0	815,237
Year 17	0	946,944	0	946,944
Year 18	0	971,104	0	971,104
Year 19	0	994,032	0	994,032
Year 20	0	970,772	0	970,772
Year 21	0	957,328	0	957,328
Year 22	0	944,106	0	944,106
Year 23	0	893,389	0	893,389
Year 24	0	855,797	0	855,797

Year 25	0	838,849	0	838,849
Year 26	0	-2,502,871	0	-2,502,871
Year 27	0	-2,005,630	0	-2,005,630
Year 28	0	-3,339,627	0	-3,339,627
Year 29	0	-3,363,853	0	-3,363,853
Year 30	0	-2,687,261	0	-2,687,261
Year 31	0	231,137	0	231,137
Year 32	0	299,063	0	299,063
Year 33	0	368,540	0	368,540
Year 34	0	394,437	0	394,437
Year 35	0	478,086	0	478,086
Year 36	0	474,160	0	474,160
Year 37	0	477,911	0	477,911
Year 38	0	545,374	0	545,374
Year 39	0	647,236	0	647,236
Year 40	0	785,404	0	785,404
Year 41	0	815,237	0	815,237
Year 42	0	946,944	0	946,944
Year 43	0	971,104	0	971,104
Year 44	0	994,032	0	994,032
Year 45	0	970,772	0	970,772
Year 46	0	959,597	0	959,597
Year 47	0	945,795	0	945,795
Year 48	0	895,764	0	895,764
Year 49	0	858,053	0	858,053
Year 50	0	840,591	0	840,591
Year 51	0	-5,092,716	0	-5,092,716
Year 52	0	549,280	0	549,280
Year 53	0	-3,399,772	0	-3,399,772
Year 54 (1 July 2061 – 30 June	0	-3,477,480	0	-3,477,480

2062)				
Total	0	2,838,962	0	2,838,962

Table 14. Estimated net GHG removals.

Estimated GHG removals for the project crediting period, includes VCS buffer. The calculation of the emission reductions follows the VCS AFOLU Requirements for ARR projects with harvesting and the AFOLU Guidance “Example for Calculating the Long-Term Average Carbon Stock for ARR Projects with Harvesting”, with a long-term average GHG benefit of 5,814,537 tCO₂, considering the buffer account which is 1,153,961 tCO₂ the Maximum VCU allowed for the project activity are 4,660,576 tCO₂.

Year	Total credits available each year	VCUs with Buffer
Year 1 (1 July 2009- 30 June 2010)	10,103	8,284
Year 2	28,791	23,608
Year 3	62,520	51,266
Year 4	115,884	95,024
Year 5	153,444	125,823
Year 6	231,137	189,532
Year 7	299,063	245,231
Year 8	368,540	302,203
Year 9	394,437	323,438
Year 10	478,086	392,030
Year 11	474,160	388,811
Year 12	477,911	391,887
Year 13	545,374	447,207
Year 14	647,236	530,733
Year 15	785,404	644,031
Year 16	742,446	501,468
Year 17	0	0
Year 18	0	0
Year 19	0	0
Year 20	0	0
Year 21	0	0
Year 22	0	0
Year 23	0	0
Year 24	0	0
Year 25	0	0
Year 26	0	0
Year 27	0	0
Year 28	0	0
Year 29	0	0
Year 30	0	0

Year 31	0	0
Year 32	0	0
Year 33	0	0
Year 34	0	0
Year 35	0	0
Year 36	0	0
Year 37	0	0
Year 38	0	0
Year 39	0	0
Year 40	0	0
Year 41	0	0
Year 42	0	0
Year 43	0	0
Year 44	0	0
Year 45	0	0
Year 46	0	0
Year 47	0	0
Year 48	0	0
Year 49	0	0
Year 50	0	0
Year 51	0	0
Year 52	0	0
Year 53	0	0
Year 54 (1 July 2061 – 30 June 2062)	0	0
Total	5,814,537	4,660,576

Table 15. Estimated net GHG removals with LTA and Buffer calculation

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	D_j
Data unit	T d.m. m ⁻³
Description	Density (overbark) of tree stem for tree species j
Source of data	<p>The value is estimated by the following formula:</p> $D_j = D_{wood,j} * (1 - \%Bark_{volume}) + D_{bark,j} * \%Bark_{volume}$ <p>Where:</p> <p>D_j = Density (overbark) of tree species j; t d.m. m⁻³</p> <p>$D_{wood,j}$ = Basic wood density of tree species j; t d.m. m⁻³</p> <p>Values from Table 3A.1.9 of IPCC GPG-LULUCF 2003 are used unless transparent and verifiable information can be provided to justify different values</p>

	<p>%Bark_{volume} = Volume of tree trunk that is made of bark; percent. Default value of 15% is used unless Transparent and verifiable information can be provided to justify a different value.</p> <p>D_{bark,j} = Density of bark of species <i>j</i>; t d.m. m⁻³. Default value of 0.4 is used unless transparent and verifiable information can be provided to justify a different value</p>
Value applied:	0.485 t.d.m./m ³
Justification of choice of data or description of measurement methods and procedures applied	This Data/Parameter is used in Equation (1) of the Methodological tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"
Purpose of Data	Calculation of project removals
Comments	-

Data / Parameter	$BEF_{2,j}$
Data unit	Dimensionless
Description	Biomass expansion factor for conversion of stem biomass to above-ground biomass for tree species or group species <i>j</i>
Source of data	IPCC default values (Table 3A.1.10 of IPCC GPG-LULUCF 2003)
Value applied:	1.3
Justification of choice of data or description of measurement methods and procedures applied	<p>The data is chose according the climate zone (tropical) and forest type (pines).</p> <p>It is considered the value of pines due to is the most conservative value (lowest value of the table) the other value of the table 3A.1.10 is 3.4 for Broadleaf forest type.</p>
Purpose of Data	Calculation of project removals
Comments	-

Data / Parameter	R_j
Data unit	Dimensionless
Description	Root-shoot ratio for species or group of species <i>j</i>
Source of data	<p>The value of R_j is calculated as $R_j = \exp[-1.085+0.9256 \cdot \ln(A)]/A$, where <i>A</i> is above-ground biomass (t d.m. ha⁻¹) [Source: Table 4.A.4 of IPCC GPG-LULUCF 2003]</p> <p>The value of the above-ground biomass is obtained with the information of Proteak.</p>
Value applied:	0.31
Justification of choice of	The value calculated was using the most conservative value of above-ground biomass. The calculation model shows the

data or description of measurement methods and procedures applied	conservative approach.
Purpose of Data	Calculation of project removals
Comments	-

Data / Parameter	$f_{IN,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline input regime (e.g. crop residue returns, manure) in stratum i of the areas of land
Source of data	Tables 6 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities. The grassland is considered without input of fertilizers, according to the tool it is assigned an input factor of 1.
Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of project removals
Comments	The value is considered with a low use of manure.

Data / Parameter	$SOC_{REF,i}$
Data unit	t C ha ⁻¹
Description	Reference SOC stock corresponding to the reference condition in native lands (i.e. non-degraded, unimproved lands under native vegetation . normally forest) by climate region and soil type applicable to stratum i of the areas of land
Source of data	Tables 3 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities. The value selected is taking into account the High Activity Clay soil and the tropical wet weather.
Value applied:	44
Justification of choice of data or description of measurement methods and procedures applied	For the calculation of this value is used official information of the INEGI ⁴² . The main soils related to the project plantations are: Gleysol, Rendzine, Regosols, Cambisols In the case of Regosols and Cambisols the tool classifies these soils as High Activity Clay (HAC), in the case of the Gleysol and

⁴² INEGI. Instituto Nacional de Estadística y Geografía. Principales Tipos de Suelo. Available at: <http://mapserver.inegi.gob.mx/geografia/espanol/datosgeogra/fisigeo/suelos.cfm>

	<p>Rendzine is considered as lands where the clay percentage is 24 and 29%, respectively⁴³, those lands can be considered as LAC.</p> <p>However in order to be conservative it is considered the default reference soil organic C stock to be as tropical wet and HAC soil due to the reference value is the lowest (conservative assumption).</p>
Purpose of Data	Calculation of project removals
Comments	-

Data / Parameter	$f_{MG,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline management regime in stratum i of the areas of land; dimensionless
Source of data	<p>Tables 6 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities.</p> <p>It is considered as a severely degraded level, the lands are identified as degraded lands using the The "Tool for the identification of degraded or degrading lands for consideration in implementing A/R CDM project activities"</p> <p>Stage 1 of the tool requires the PP to screen the lands of the project to determine whether the area has been classified as "degraded" under any verifiable local, regional, national or international land classification system or credible study produced within the last ten years.</p> <p>In this case is used the report of SEMARNAT (National Environmental Agency) that demonstrates the soil degradation of the country⁴⁴. The maps 3-2 (page 118), 3-3 (page 119) and 3-4 (122), show that the regions of the project activity falls in the category of degraded and the causes of the degradation is overgrazing⁴⁵.</p>
Value applied:	0.70
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of project removals
Comments	-

⁴³ INEGI. Instituto Nacional de Estadística y Geografía. Perfiles de Suelo. Page 18. Available at: <http://mapserver.inegi.gob.mx/geografia/espanol/prodyserv/prods-geograficos/perfiles/perf.pdf>

⁴⁴ SEMARNAT. Chapter 3. Soil. Available at: http://app1.semarnat.gob.mx/dgeia/informe_2008_ing/03_suelos/cap3_2.html

⁴⁵ SEMARNAT. Oficial Document Chapter 3. Available at: http://app1.semarnat.gob.mx/dgeia/informe_2008_ing/pdf/cap_3_suelos.pdf

Data / Parameter	$f_{LU,i}$
Data unit	Dimensionless
Description	Relative stock change factor for baseline land use in stratum i of the areas of land
Source of data	Tables 6 of "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM Project" activities. According to the tool, all permanent grassland is assigned a land-use factor of 1.
Value applied:	1
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of project removals
Comments	-

Data / Parameter	Volume table or equation
Data unit	m^3
Description	Volume table or volume equation that predicts stem volume on the basis of one or more measurements of the tree.
Source of data	Publication of University of Bangkok
Value applied:	N/A
Justification of choice of data or description of measurement methods and procedures applied	<p>The equations are the following and depend of the Diameter and the High of the tree.</p> <p>For Stem biomass (W_S) : $\log W_S = 0.9797 \log (D^2H) - 1.6902$; $r^2 = 0.9930$</p> <p>For Branch biomass (W_B) : $\log W_B = 1.0605 \log (D^2H) - 2.6326$; $r^2 = 0.9567$</p> <p>For Leaf biomass (W_L) : $\log W_L = 0.7088 \log (D^2H) - 1.7383$; $r^2 = 0.8523$</p> <p>According to the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities"</p> <p>For ex ante estimation of aboveground tree biomass in project scenario any allometric equation can be used.</p>
Purpose of Data	Calculation of project removals
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	$A_{p,i}$
Data unit	Ha
Description	Area of sample p in stratum i
Source of data	Field measurement
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Every five years since the year of the initial verification.
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Purpose of data	Calculation of project removals
Calculation method	N/A
Comments	Sample plot location is registered with a GPS and marked on the project map.

Data / Parameter	DBH
Data unit	cm or any unit of length as specified
Description	Usually the diameter at breast height of the tree, but it could be any other diameter or dimensional measurement (e.g. basal diameter, root-collar diameter, basal area, etc.) applicable for the model or data source used. Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, are applied
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied. In absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event

Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Purpose of data	Calculation of project removals
Calculation method	N/A
Comments	N/A

Data / Parameter	H
Data unit	M
Description	Height of tree
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	Standard operating procedures (SOPs) prescribed under national forest inventory are applied in the absence of these, SOPs from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Frequency of monitoring/recording	Before every verification event
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Purpose of data	Calculation of project removals
Calculation method	N/A
Comments	N/A

Data / Parameter	T
Data unit	Year
Description	Time period elapsed between two successive estimations of carbon stock

Source of data	Recorded time
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	N/A
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	N/A
Purpose of data	Calculation of project removals
Calculation method	N/A
Comments	If the two successive estimations of carbon stock are carried out at different points of time in year t2 and t1, (e.g. in the month of April in year t1 and in the month of September in year t2), then a fractional value shall be assigned to T.

Data / Parameter	Volume table or equation
Data unit	m ³
Description	Volume table or volume equation that predicts stem volume on the basis of one or more measurements of the tree.
Source of data	Publication of University of Bangkok
Description of measurement methods and procedures to be applied	<p>The equations are the following and depend of the Diameter and the High of the tree.</p> <p>For Stem biomass (W_S) :</p> $\text{Log } W_S = 0.9797 \log (D^2H) - 1.6902; \quad r^2 = 0.9930$ <p>For Branch biomass (W_B) :</p> $\text{Log } W_B = 1.0605 \log (D^2H) - 2.6326; \quad r^2 = 0.9567$ <p>For Leaf biomass (W_L) :</p> $\text{Log } W_L = 0.7088 \log (D^2H) - 1.7383; \quad r^2 = 0.8523$ <p>According to the tool "Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities"</p> <p>For ex post estimation of aboveground tree biomass an allometric equations is valid if:</p> <ul style="list-style-type: none"> The equation was derived from a data set of at least 30 sample trees, and the value of coefficient of determination

	(R ²) obtained was not less than 0.85.
Frequency of monitoring/recording	Before every verification event.
Value applied:	N/A
Monitoring equipment	N/A
QA/QC procedures to be applied	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied. In the absence of these, QA/QC procedures from published handbooks, or from the IPCC GPG LULUCF 2003, may be applied.
Purpose of data	Calculation of project removals
Calculation method	N/A
Comments	These formulas are considered as globally applicable data, therefore, are valid for the project activity.

4.3 Monitoring Plan

Monitoring will be done according to the consolidated methodology AR-ACM0003 Afforestation and reforestation of lands except wetlands. Version 01.0.0 Analysis of its applicability conditions have been developed in section 2.2 of this PD.

Monitoring comprises gathering information, performing calculations and making estimations of GHG emissions and removals. It ensures that commonly established principles of forest inventory and management are put into practice. All data gathered as part of the monitoring plan is archived electronically and kept at least for two years after the end of the last crediting period.

Physical limits will be calculated and checked periodically. The project boundary and the boundaries of pre-defined strata will be adjusted after plantations are established. This will be done using GPS technology, and the information will be organized in GIS format. Areas of each stratum will be recalculated and adjusted accordingly.

All activities performed in each stratum will be recorded and relevant parameters quantified. This includes the following:

- Site preparation: application of herbicides, tillage operations (date of operation, tools used, number of passes, width of operation in strip tillage, depth of operation, chemical weed control).
- Planting date, number of trees planted per unit area, tree species.
- Tree survival rate
- Fertilization date, application form, type and amount of fertilizer used.
- Harvesting date, volumes of wood removed by type of product.
- Disturbances: date, location, affected area (using GPS), type of disturbance, biomass lost

Sampling design and stratification

Project boundaries will be defined at the beginning of project activity and updated along the crediting period. Boundaries may vary or new strata may be created after disturbances effects (pests, droughts, fire) and boundaries will be redefined. Geographic coordinates are established,

recorded and archived. A Geographic Information System will be implemented with the following basic layers:

- Project boundaries
- Soils map
- Projected land-use map
- Roads, fences, firebreaks, wood stocking areas, buildings, etc.
- Permanent sampling plots

The database on strata will be updated at periodic intervals taking into account the following aspects:

- Unexpected disturbances occurring during the crediting period (e.g. due to fire, pests or disease outbreaks), affecting differently different parts of an originally homogeneous stratum or stand;
- Changes in the forest management regime if any occurring during the project period (e.g., pruning, thinning, etc.) and the dates and locations implementing the management regime shall be monitored and recorded.

Permanent sampling plots will be used for sampling over time to measure and monitor changes in carbon stocks of above and below ground biomass. The location of samples within the plot has been decided randomly to avoid any bias. The project boundary will be supervised by monitoring parcels using GPS. Any changes in project boundary will be accounted for in all calculations of actual net GHG removals by sinks. The monitoring methodology uses permanent sample plots to monitor carbon stock changes in above- and below-ground biomass pools. To reach the targeted precision level of about $\pm 10\%$ of the mean at the 90% confidence level in a cost-effective manner, the number of plots needed in each stratum has been determined following the equation 1 and 4r of the Methodological tool "Calculation of the number of sample plots for measurements within A/R CDM project activities" version 02.1.0.

$$n = \frac{N * t_{VAL}^2 * \left(\sum_i w_i * s_i \right)^2}{N * E^2 + t_{VAL}^2 * \sum_i w_i * s_i^2} \quad \text{Equation (16)}$$

Where:

n = Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless

N = Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless

t_{VAL} = Two-sided Student's t-value, at infinite degrees of freedom, for the required confidence level; dimensionless

w_i = Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless

s_i = Estimated standard deviation of biomass stock in stratum i; t d.m. (or t d.m. ha-1)

E = Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. (or t d.m. ha-1), i.e. in the units used for i

The number of sample plots calculated is 530, according to the Tool due the first iteration is more than 30, then no further iteration is carried out and the value of n obtained in the first iteration is the final value of n, thus n= 530⁴⁶.

⁴⁶ According to the tool the value for E is 10%, a t_{VAL} value is used with 90% of confidence level.

After obtain the total number of sample plots of the project activity it was used the equation 4 to obtain the samples plots allocated to a stratum with the following formula:

$$n_i = n * \frac{w_i * s_i}{\sum_i w_i * s_i} \quad \text{Equation (17)}$$

Where:

- n_i = Number of sample plots allocated to stratum i; dimensionless
- n = Number of sample plots required for estimation of biomass stocks within the project boundary; dimensionless
- w_i = Relative weight of the area of stratum i (i.e. the area of the stratum i divided by the project area); dimensionless
- s_i = Estimated standard deviation of biomass stock in stratum i; t d.m. (or t d.m. ha-1)
- i = 1, 2, 3, biomass stock estimation strata within the project boundary

The following table summarizes the sample plots per strata (defined in the stratification section), it's important to state that defining feature of the strata was the year of plantation.

Strata	Year of Plantation	Ap,i	ni
Strata 1	2009	875.42	108
Strata 2	2009	62.43	8
Strata 3	2010	297.99	37
Strata 4	2010	400.04	50
Strata 5	2011	684.94	85
Strata 6	2011	296.56	37
Strata 7	2012	819.44	102
Strata 8	2012	113.00	14
Strata 9	2013	720.00	89
Total		4,269.82	530

Table 16. Sample plots per strata

Due the project activity is considered as a grouped project the calculation of the plots will be updated with the increase of the plantation area of the project.

The measurement process will be done with the last procedure of Proteak, for this case this consist to the document named "Inventario de Control Pre-postraleo, Plantaciones a Terceros" with the Code IT-INV-02. In case of a change of the procedure the new procedure will follow the methodology conditions.

Responsibilities

The planned operational and management structure that will monitor emission reductions of the project will include:

- Person(s) responsible for monitoring, recording, reporting and archiving measured data.
- Person(s) responsible for performing the emission reduction calculations based on the methodology and preparing the Monitoring Report as appropriate.
- Person(s) responsible for reviewing and approving the calculations and Monitoring Report.

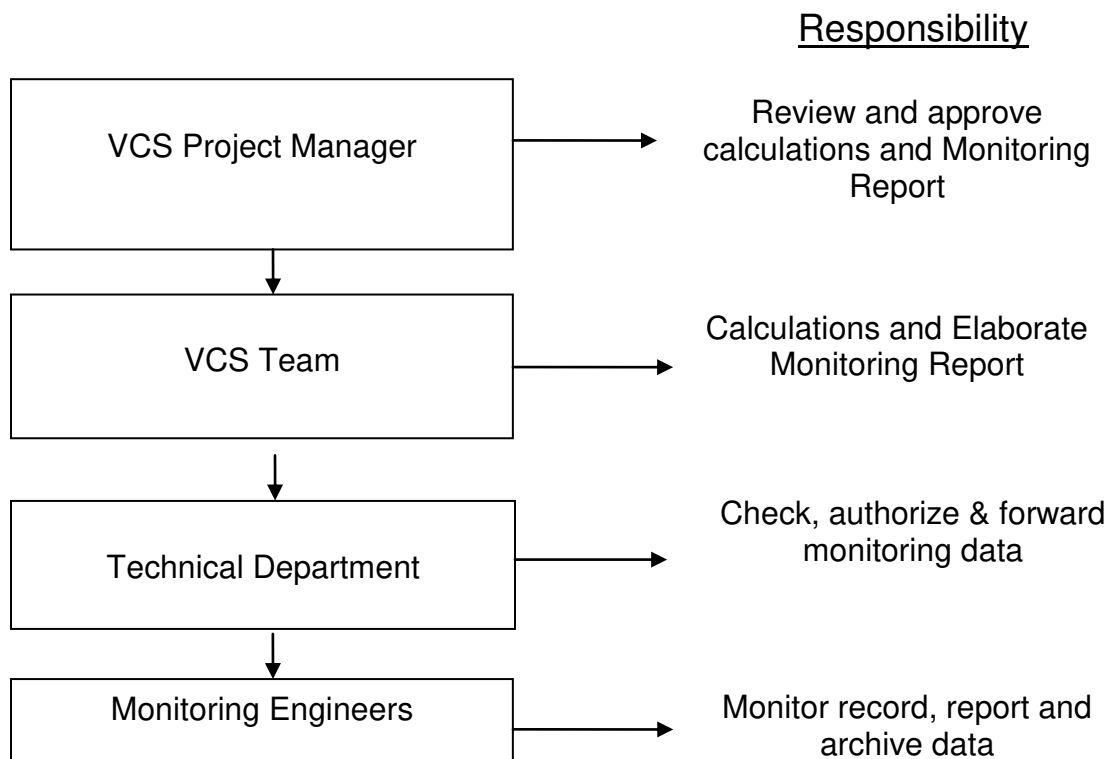


Figure 11. Flow diagram of monitoring emissions

5 ENVIRONMENTAL IMPACT

An Environmental Impact Assessment is not legally required for the commercial forest plantations, they are exempted from this obligation since the paragraph VI of the Article 28, of the General Law of Ecological Balance and Environmental Protection in Mexico was cancelled. However, since Proteak is interested in knowing the possible environmental impacts of the proposed project activity an Environmental Impact Assessment⁴⁷ has been prepared leading to the following main conclusions:

CLIMATE CHANGE

Climate change mitigation is achieved mainly through carbon sequestration as shown in this PD. In summary there is an important positive impact that the project will bring to the country.

SOIL

The clean activities of secondary vegetation and site preparation, will cause prompt removal of earth and solid waste generation (waste vegetation removed). Although the degree of interaction for the relation cause-effect, magnitude, reversibility and probability of occurrence are identified as significant, they don't encourage cumulative or synergistic actions. Actions such as site preparation, have a compensatory effect due to the fact that the generated organic material is deposited in the soil to act as mulch.

WATER

The surface runoffs are one of the environmental factors that could be affected the most. In order to mitigate the effects of the project in the surface runoffs water works will be made, such as

⁴⁷ Servicios Técnicos Forestales y Ambientales. Estudio Ambiental de Impacto al Suelo por la Ejecución del Proyecto de Plantaciones Forestales de la Empresa Proteak Uno S.A.B de C.V. Page 4-21

bridges, culverts, ditches, gutters and drain counters on roads. The furrow is made following the contours and ridges are made to control water runoff and reduce water erosion.

VEGETATION

The effect on the vegetation is only in the area where it will be removed; however any significant effect in the areas adjacent to the project it is neither observed nor expected; considering that the removed vegetation is secondary vegetation different to the forest. In order to mitigate this impact, Proteak expects to start a program at the end of the project plantation in order to re-establish the vegetation of the region and improve the vegetation zone.

AIR

Some of the activities related to the project activity require the use of machinery and equipment, which provoke gaseous pollutants (smog) and particle release. No materials that generate liquid residues that can evaporate will be used, neither solid waste that may decompose and release components to the air will be used. In addition, activities are developed in wide open areas, where natural system will have the ability to absorb any impairment caused by the emission of contaminant particles. The same applies to noise. However within the mitigation measures it is proposed to use only vehicles and equipment in optimal conditions.

RELIEF

Actions that could affect more intensely the process of modification for this factor are involved in ground preparation, however the impact is considered to be insignificant, since the land chosen for the project are plane and mitigation measurements will be applied if necessary.

WILDLIFE

The effect on wildlife takes place only during the time of the site preparation and forest plantation establishment, and it is expected that it will not have any significant negative effect, since the project activity will generate niches for wildlife with the development of the trees and education actions will be carried out. During the project operation, a maintenance program of the species will be established in order to preserve them, so this won't be a high impact.

LANDSCAPE

The effect on landscape will be due to the secondary vegetation removal and site preparation; the effect is expected to be of medium magnitude and short term, and slight magnitude and medium term, by the implementation of mitigation measures. It is worth to mention the fact that the project is located on agricultural and pasture land, which means that the environment is already impacted; furthermore, at medium term the quality of the landscape will be improved by the establishment of the forest.

SOCIOECONOMIC FACTORS

In this aspect, a significant positive effect in the short, medium and long terms is expected, since the project will bring various benefits such as job creation, direct and indirect, local and regional economic benefits. These will translate in positive significant benefits (direct and indirect) in pro of the region development.

The structure and function of the regional environmental system, based on a complex web of biotic and abiotic interactions, owe its functioning to the interrelationship of various elements. The changes generated by the project execution will have an effect on various environmental components, however it is estimated that in balance the effect will be significantly positive.

6 STAKEHOLDER COMMENTS

Local stakeholders refer to the communities that will be directly affected by the development of the project. In this case, people from communities close to the project were interviewed in a

meeting that took place on different places according the plantations that correspond to the states of Mexico (Nayarit, Chiapas and Tabasco).

In all the interviews, Proteak UNO S.A.B. de CV. explained the project, the advantages and technical requirements, as well as the importance of VCS developments.

In order to evidence the stakeholder's consultation the following documentation is added to the DOE.

- Presentation of the stakeholders consultation
- Surveys of the stakeholders consultation
- Summary of the surveys comments.

The VCS consultation was taken the dates 25 March 2013 and 12 April 2013.

The comments obtained from the surveys are:

Tabasco State

- Increase the project in all Tabasco State
- Continue with this kind of project in order to benefit the society and the new generations.
- Continue with the activity of plant in all the areas without a tree.
 - Proteak as is shown in this PD plans to increase the project capacity in the next years. The idea of Proteak follows the requirements of the stakeholders.

Nayarit State

- Generate more similar projects in order to have more benefits to the community
- Have more benefits
 - Proteak has increase the benefit of the project, as is shown in the site visit the people that is hired is people that live near the region of the project, this plan gives an additional support to the community members.

Chiapas State

- The project is important because it improves the economy of the place, due to the project generates more employees.
- Continue with this activity in order to generate more environmental benefits

Additionally as was stated before the project obtained the FSC certification, in this process it was necessary to make a stakeholder consultation, this consultation was made at the end of the year 2012.

The PP has given to AENOR the evidence of the stakeholders surveys made in the FSC stakeholders consultation.