ASES ON-CHAIN PROTOCOL

BASELINE REPORT

Verified Carbon Credits (VCCs)

Manejo Forestal La Solución Somos Todos

BEL-002-MEX-20062024 PARAÍSO, TABASCO, MÉXICO

Desarrollos Sostenibles BELMEX S.A. de C.V.

Type B Project

March 18, 2025

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On-Chain Protocol

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Executive Summary

The baseline report of the plantation project is a necessary activity for their certification since it will allow for establishing the initial parameter of biomass generation and therefore the carbon sequestration in each of the projects. The report will consist of the generation of NDVI and biomass indexes, which are generated through a specific methodology and with the use of satellite images and high-resolution ortho mosaics.

The mangrove reforestation and restoration project in Paraiso, Tabasco, Mexico entailed planting a total of approximately 100,000 mangrove trees, representing three (3) distinct species consisting of a variety of mangrove plants native to the region and well-suited for adverse environmental conditions. The primary objective of this initiative is to maintain mangrove channels, monitor against illegal logging and fires, and manage wildlife habitats. Additional activities include forest inventory, mapping, and ecosystem restoration to rehabilitate degraded areas and promote ecological balance. The project area encompasses a total land area of 1,919 hectares, with an intervention zone of 1,146.50 hectares.

The dense planting technique was employed, providing numerous benefits such as increased yield and efficient resource utilization. The planting density measured within the project area was equivalent to 1,667 trees per hectare.

The total CO_2 capture for the entire project area was calculated to be between 5,899.19 and 31,060.14 TCO_2-eq considering survival scenarios of 17.99% and 94.72% respectively at the end of the 40 years of the project's lifetime. Furthermore, accounting for an 80% survival rate, as proposed by the project developer, and applying it to the total CO_2 capture determined by the aOCP, results in a total of 26,233.23 TCO_2-eq.

The successful mangrove reforestation effort in Paraíso will highlight the benefits of dense planting techniques and the strategic selection of native species in restoring and rejuvenating degraded coastal areas. This approach will enhance ecosystem resilience while delivering ecological, economic, and social advantages for the region and its communities.

I. Project Design

This section is based on the information compiled in the PSF Format - Project Submission Form prepared by the project developer.

I.1. Project Location

The project is in Paraiso, Tabasco (Mexico). The reforested plot is composed of mangrove and open water channels. A project location map is illustrated in Figure 1. Table 1 shows the central coordinates of the reforested Plot.

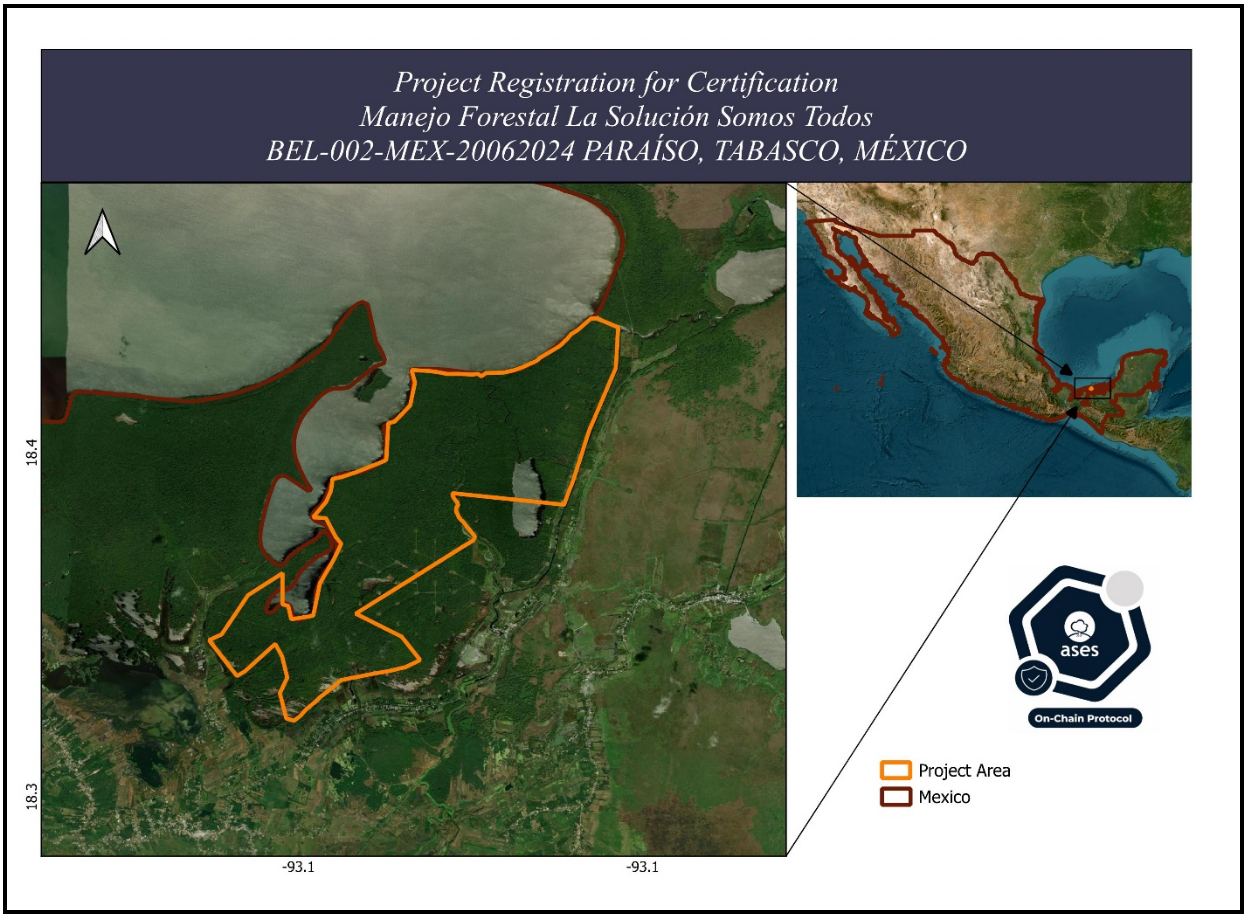


Figure 1. Project Location

Table 1. Location of project plot

Plot	Coordinates	
	Latitude	Longitude
1	18.350710°N	-93.102586°W

I.2. ADMINISTRATIVE SPECIFICATIONS

This section introduces the project developer, outlines the project type, and specifies the nature-based credits for which the proponent is applying.

I.2.1. PROJECT DEVELOPER

Project Code	BEL-002-MEX-20062024 PARAÍSO, TABASCO, MÉXICO
Title of the project activity	Manejo Forestal La Solución Somos Todos
Company	Desarrollos Sostenibles BELMEX S.A. de C.V.
Person responsible	Carlos Alfonso Sandoval Miranda

I.2.2. TYPE OF PROJECT

Project registration year	2025
Project duration	40 years
Issuance of credits	Annual
Methodology applied	*Methodology for the issuance of verified carbon credits for mangrove projects V1.0*
Type	☒ Forest management ☐ Regenerative agriculture ☐ Silvopastoral management ☐ Individual tree-based climate action / urban forest ☐ Water flow restoration ☐ Biochar

I.2.3. VNPCS THE PROJECT IS APPLYING TO

Type of VNPCs the project is applying for	☒ Carbon Removals (VCRm) ☐ Carbon Removals (VCRd) ☐ Biodiversity Based Credit (VBBC) ☐ Water Credits (VWC) ☐ Soil Credits (VSC) ☐ Climate action bond

II. PROJECT AREA BASELINE

According to the ESA-worldcover-v200 land-use/land cover map, the project area is composed almost entirely of mangroves or open water, with a few sparse areas along the perimeter consisting of wetland or grassland.

II.1. SPECTRAL RESPONSE

When solar radiation interacts with an object, one of three situations can occur, either individually or in combination:

- Reflection: The radiation can bounce off the object partially or entirely, resulting in reflection.
- Absorption: The object can absorb the radiation, taking in its energy.
- Transmission: Radiation can pass through one object and reach another, known as transmission.

The extent to which radiation is reflected, absorbed, or transmitted depends on the specific physicochemical characteristics of the objects involved. However, for object identification purposes, our primary interest lies in the reflected light or radiation at different wavelengths. For instance, vegetation exhibits low reflectance in the visible range, but the presence of chlorophyll in plants increases reflectance in the green channel. On the other hand, plants demonstrate the highest reflectance in the near infrared region of the electromagnetic spectrum.

II.1.1. INDEX

Vegetation indices (VI) are extensively employed for monitoring and detecting changes in vegetation and land cover. These indices are created by considering the contrasting absorption, transmittance, and reflectance of energy by vegetation across the red and near-infrared portions of the electromagnetic spectrum. Numerous studies have demonstrated that the Normalized Difference Vegetation Index (NDVI) is particularly resilient against the influence of topographic factors. NDVI is commonly utilized as a broad indicator of photosynthetic activity in plants and the corresponding aboveground primary production.

The calculation of NDVI was performed using Sentinel-2 satellite images in the Google Earth Engine platform. Images with less than 30% cloud cover were selected for each month. The assessment focused on the average monthly NDVI time series spanning from January 2019 to January 2025. The NDVI analysis in Figure 2 shows seasonal fluctuations and an overall cyclical pattern of vegetation health in the project area, including periods of decline followed by recovery. From 2019 to mid-2020, NDVI values gradually decreased, followed by a period of stabilization and moderate recovery through 2021 and 2022. A notable peak occurred in late 2023, but this was followed by another decline throughout 2024. The analysis of the most recent months suggests a downward trend, which may indicate environmental changes or seasonal variations affecting vegetation health.

Given the known information that a healthy, dense vegetation canopy typically exhibits NDVI values above 0.5, while sparse vegetation generally falls within the range of 0.2 to 0.5, the current assessment indicates that the project area boasts healthy vegetation, and further project activities are expected to maintain and improve vegetation health and support ecological balance within the mangrove.

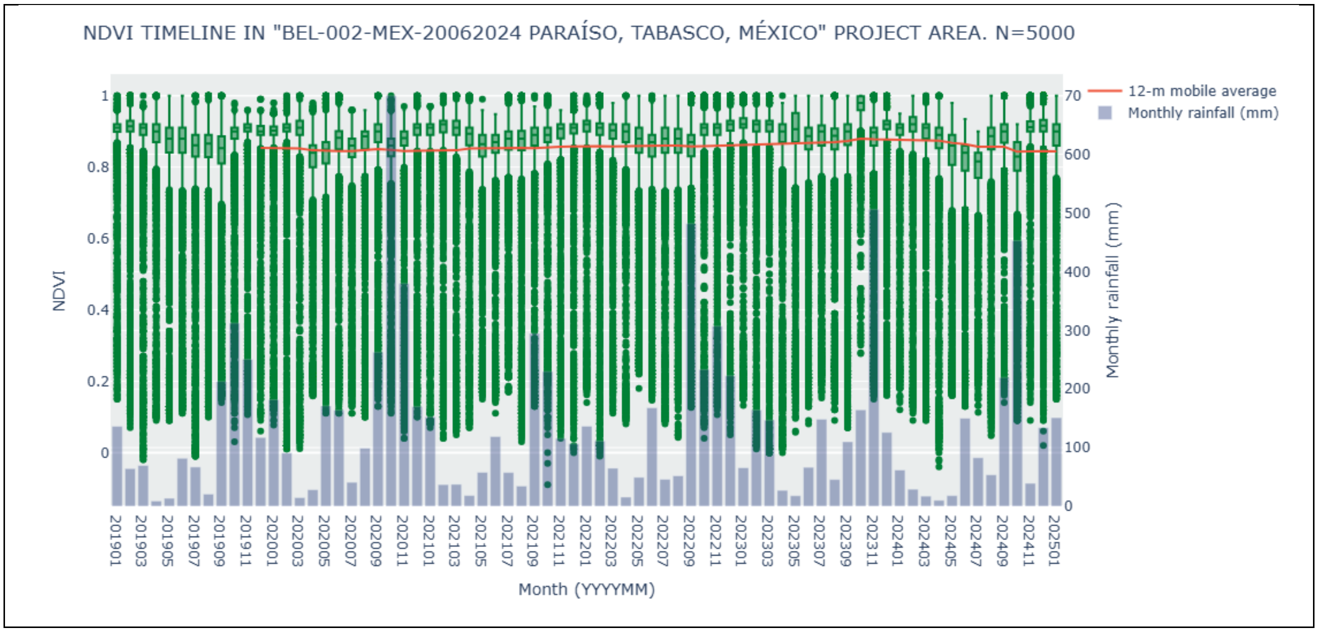


FIGURE 2. NDVI TIMESERIES IN THE AREA OF INTEREST

II.2. IMPACT ON THE LANDSCAPE

The project has had a significant impact on the landscape through large-scale reforestation and ecosystem restoration efforts. Covering an intervention area of 1,146.50 hectares, the project has focused on restoring mangrove forests, managing wildlife habitats, and implementing fire and illegal logging monitoring. With 100,000 mangrove trees planted, the project has aimed to counteract deforestation, improve biodiversity, and enhance carbon sequestration. Overall, the initiative contributes to climate action, biodiversity conservation, and the promotion of sustainable livelihoods.

FIGURE 3. SATELLITE AERIAL VIEW OF THE PROJECT AREA (2023)

III. TECHNICAL SPECIFICATIONS

III.1. CARBON REMOVAL

This section analyzes the estimated carbon sequestration expected from the reforestation efforts implemented by the project.

III.1.1. REFORESTED AREA

The project encompasses a plot with a total area measuring 11,465,000 m^2; the demarcated plot is shown in Figure 5.

III.1.2. SPECIES

The reforestation project successfully planted a total of 100,000 trees, encompassing (3) different species. The approximate number of individuals of each species is shown in Table 2; approximations were based from an audit conducted in the project area in March 2024. The selection of species was based on a preliminary assessment of the region, considering available bibliographic information, as well as the prevailing climatic, vegetational, and meteorological conditions. All species chosen are indigenous to the area and well-suited to the local climate and environmental conditions.

Out of the total number of trees planted (126,780), the percentage by species is presented in Table 2.

TABLE 2. NUMBER OF TREES BY SPECIES

Species	Number of trees	Percentage (%)	Origin
Rhizophora mangle	22,800	22.8	Native
Laguncularia racemosa	66,500	66.5	Native
Avicennia germinans	10,700	10.7	Native
Total	**100,000**	**100%**	

III.1.2.1. Distribution of the species selected for reforestation

The distribution of plant species is influenced by a variety of abiotic and biotic factors, including:

- Climate
- Soil
- Topography
- Hydrology
- Competition between plants for resources
- Seed dispersal

These factors interact in complex ways to determine the distribution of plant species across a landscape.

Understanding and knowing the distribution of the flora species that have been selected for reforestation is important to ensure the adaptation of the new trees and their survival, to secure the long-term benefits of the project, and to avoid altering the ecosystem balance by introducing non-adapted species.

To achieve this, each species was consulted in the Global Biodiversity Information Facility GBIF (https://www.gbif.org). This database allows you to know the species classified as introduced in each country, their EUNIS habitat, their native range, and observation records.

The Global Register of Introduced and Invasive Species (GRIIS) presents validated lists of introduced (alien) and invasive alien species at the country, territory, and associated island level. The International Union for Conservation of Nature (IUCN) describes an introduced/alien and invasive alien species as follows:

- Introduced/alien species: A species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e., outside the area, it could occupy without human intervention) and which has been transported by human activity; this includes any parts, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce.
- Invasive alien species: A species that becomes established in natural or semi-natural ecosystems or habitats, is an agent of change, and threatens native biological diversity. This includes widespread species, rapidly expanding, or present in high abundance and that hurts biodiversity.

According to the aOCP's eligibility criteria, species classified as invasive alien species cannot be counted towards the project's benefits.

- ***Rhizophora mangle***

Recorded as introduced in Mexico	☐ Yes ☒ No
Habitat EUNIS	Not Specified
Native range	Not Specified
Georeferenced records	

- ***Laguncularia racemosa***

Recorded as introduced in Mexico	☐ Yes ☒ No
Habitat EUNIS	Not specified
Native range	Not specified
Georeferenced records	

- ***Avicennia germinans***

Recorded as introduced in Mexico	☐ Yes ☒ No
Habitat EUNIS	Not Specified
Native range	Not Specified
Georeferenced records	

All the mangrove species are native to Mexico; therefore, their inclusion in the project is accepted.

The technical data sheets providing detailed information about the species utilized for the reforestation project are included below, in Table 3. These sheets offer comprehensive insights into the characteristics, growth patterns, environmental requirements, and other relevant details of the selected plant species. These data sheets serve as valuable references for understanding the specific attributes and suitability of each species for the reforestation efforts.

Table 3 Technical Data Sheets of Species Used for Reforestation

Rhizophora mangle – Red Mangrove • Pioneer species of mangrove • Evergreen tropical shrub • Grows on stilted roots in marshy mangroves • Increases coastal resilience to geoclimatic hazards • Partially submerged, lives in saline environments	
Laguncularia racemosa – White Mangrove • Evergreen tropical shrub • Grows on stilted roots in marshy mangroves • Increases coastal resilience to geoclimatic hazards • Partially submerged, lives in saline environments	
Avicennia germinans – Black Mangrove • Evergreen tropical shrub • Grows on stilted roots in marshy mangroves • Increases coastal resilience to geoclimatic hazards • Partially submerged, lives in saline environments	

III.1.3. Reforestation technique

The reforestation approach used is the Dense Planting technique. This method, also known as high-density or intensive planting, involves closely spacing trees to optimize resource use and enhance ecosystem benefits. Unlike traditional forestry practices that leave significant gaps between trees, dense planting increases the number of trees per unit area, improving resource efficiency by maximizing sunlight absorption, water uptake, and nutrient availability.

In the context of mangroves, this technique offers additional advantages, such as stabilizing coastal sediments, reducing erosion, and enhancing resilience against extreme weather events. Dense planting also suppresses invasive species and accelerates habitat formation, fostering biodiversity. However, successful implementation depends on factors like local hydrological conditions, soil salinity, and ongoing management. Proper monitoring, nutrient management, and controlled thinning will be essential to prevent overcrowding, maintain tree health, and sustain long-term ecosystem functions. By employing this high-density planting strategy, the afforestation project aims to maximize carbon sequestration, restore critical wildlife habitats, and provide essential ecosystem services, ensuring long-term sustainability and resilience.

III.1.3.1. Methodological process

The operational phase is divided into three steps as shown in Figure 4.

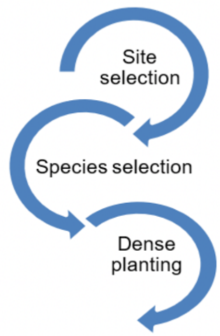


Figure 4 Methodological Process

The reforestation process involved a well-defined series of steps. Firstly, a thorough evaluation was conducted to select the most suitable reforestation area, considering restoration needs, climatic and soil feasibility, permit requirements, and cost considerations. It ensured that the chosen location was conducive to successful reforestation. To preserve the ecological integrity of the region, afforestation was not carried out on scarified ground. This approach aimed to leverage the existing ecosystem to facilitate the growth and development of the newly planted trees, promoting biodiversity and increasing the chances of successful reforestation. Local community stakeholders were actively involved in the process, fostering a sense of ownership and sustainability in the reforestation initiative.

III.1.4. Geolocalization of trees

To estimate the total expected number of trees in the entire project area, the proportion of trees counted in the surveyed area was used and scaled up to the total project area. During a field visit in early 2024, the project developer conducted surveys at 30 different sites throughout the project, measuring species presence and counting all identified species within each point (Figure 5). The surveyed area covered 1.5 hectares, and quadrat sampling was employed to categorize large trees (DNP ≥ 30cm) within a fixed area of 1/25 hectare (radius = 11.28 meters) and small trees (5 ≤ DNP < 30cm) within 1/100 hectare (radius = 5.64 meters). A total of 2,500 trees from the five listed species were identified and measured across these sites. Using this data, tree density was calculated as 1,667 trees per hectare. By applying this density to the entire 1,146.5-hectare intervention zone of the project area, the total expected number of trees is estimated to be approximately 1.91 million.

This count provides valuable insights into the spatial relative abundance of trees within each plot. The distribution percentages highlight the varying densities and concentrations of trees, indicating areas with higher and lower tree populations in cases where the reforested plots are segmented. These findings help understand tree distribution and estimate the project's carbon absorption capacity. The number of trees and their carbon sequestration capacity are crucial for the estimation of the Project's carbon sequestration potential. The number of geolocalized trees provides an overall measure, serving as a basis for estimating carbon sequestration. Combining tree count with species-specific data allows estimation of biomass and carbon capture potential. This provides a quantitative assessment of the project's capacity to absorb and sequester CO_2.

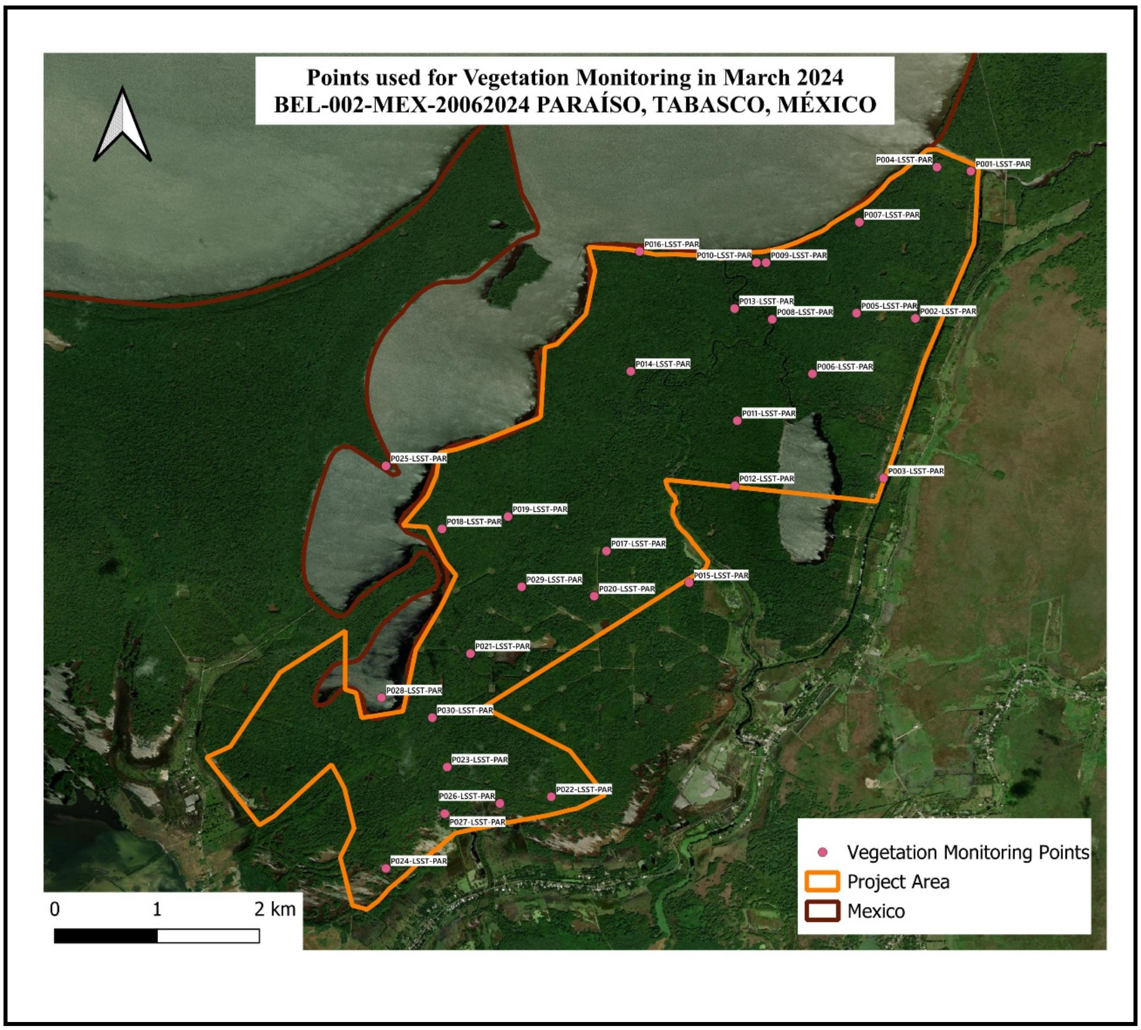


FIGURE 5 VEGETATION POINTS

Three of the points are located outside of the registered project area; further information will be requested from the project developer about the verity of these sampling points.

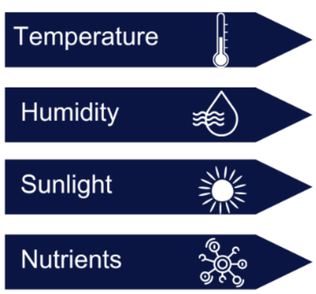
III.1.5. PROJECT CAPACITY

This section determines the project's and the area's capacity to absorb CO_2 using Net Primary Productivity (NPP) as a reference parameter. Then, the amount of CO_2 that can be captured is estimated with allometric equations considering the age and height of each species.

III.1.5.1. Net Primary Productivity (NPP)

Net Primary Productivity (NPP) is the result of organic matter production through the process of photosynthesis. However, primary productivity involves more than photosynthesis; it also encompasses the uptake of inorganic nutrients and the assimilation of diverse organic compounds into protoplasm, which are vital for all photosynthetic organisms. Among various ecosystem processes, NPP is extensively measured due to its ability to reflect carbon accumulation in ecosystems. The calculation of NPP is based on the increase in biomass per unit area over a specified period.

NPP is influenced by several factors, including:



Hence, the net primary productivity (NPP) can be expressed as the difference between the carbon absorbed by vegetation through photosynthesis (referred to as Gross Primary Production or GPP) and the carbon lost through respiration. Temperature and precipitation are key limiting factors for NPP, and it is generally assumed that NPP increases with both temperature and precipitation. However, it is important to note that the NPP cannot exceed the saturation value of 3000 gDM/m^2/year (DM stands for dry matter).

For the calculation of NPP in the La Junquera green fences and biodiversity enhancement project, the Miami methodology outlined in section "IV.1. aOCP Methodology for carbon removal and storage in vegetation" was employed. This methodology incorporates the following equations to determine NPP:

$$\mathbf{NPP} = \mathbf{min}\,(\mathbf{NPP_T}, \mathbf{NPP_P})$$

Where:

$$NPP_T = 3000(1 + exp(1.315 - 0.119\ x\ T))^{-1}$$

$$NPP_P = 3000(1 - \exp(-0.000664\ x\ P))$$

Where:

T: average annual temperature

P: accumulated precipitation

Carbon capture capacity was calculated using the conversion factor 0.47 (IPCC, 2006), using the following equation:

$$NPP_c = NPP_{dm}\ x\ 0.47$$

Where:

NPP_c: Net primary productivity, gC m² yr-1

NPP_{dm}: Net primary productivity, gDM m² yr-1

Then, the equivalence to carbon dioxide was calculated using the conversion factor of 3.67. This factor represents the molar mass ratio of CO_2:C. CO_2 molar mass is 44 and C is 12, therefore, 44/12 = 3.67. The conversion was done using the following equation:

$$CO_2\ capture\ capacity = 3.67\ (NPP_c)$$

Finally, the maximal CO_2 capture capacity for the Project area was computed by multiplying the previous result by the Project area surface. The calculation was repeated for each scenario (present with real data, present with CMIP data and future with CMIP data). Real data is privileged over modelled data for the present scenario. To estimate future NPP, the percent-change was calculated between present and future estimates done with CMIP6 data. This percent change was then applied to the present estimate done with real data, this way we obtain a future NPP estimate based on present real data.

The results (Table 4) indicate that the project area currently has an NPP of 1,706.36 gDM m^{-2} yr^{-1}, which, due to the climatic conditions, will decrease to 1,657.35 gDM m^{-2} yr^{-1} in 2062. This change, of -49.01 gDM m^{-2} yr^{-1}, represents a decrease of 2.87%. In terms of CO_2, **the total Project area (1,919 ha) is currently capable of capturing 56,669,858.94 kgCO_2 yr^{-1} and is expected to capture around 55,042,346.64 kgCO_2 yr^{-1} by 2062**.

Based on these results, it has been determined that **55,042.35 TCO_2-eq/year** will serve as the base parameter for the estimation of maximum achievable annual CO_2 capture. For the 40 years of the project, it equals **2,201,693.87 TCO_2-eq.**

TABLE 4 MAXIMUM ATTAINABLE NPP AND BIOMASS WITHIN PROJECT SITE

NPP	Present Real Data	Present CMIP	2062 CIMP	CMIP Change	CMIP % Change	2062 Based on Real Data	Real Data Change
$gDM/m^2/yr$	1706.36	2281.50	2215.98	-65.52	-2.87	1657.35	-49.01
$gCO_2/m^2/yr$	2943.30	3935.36	3822.34	-113.02	-2.87	2858.77	-84.53
$gC/m^2/yr$	801.99	1072.31	1041.51	-30.80	-2.87	778.96	-23.03
$KgCO_2/plot/yr$	56669858.94	75770836.54	73594759.70	-2176076.85	-2.87	55042346.64	-1627512.29

III.1.5.2. Allometric Equations

Allometric equations are mathematical formulas used to estimate the amount of CO_2 that can be captured and stored in certain types of vegetation, such as trees or shrubs, depending on their morphometry. Table 5 shows the allometric equations used for each species planted.

TABLE 5 ALLOMETRIC EQUATIONS USED FOR EACH SPECIES

Species	Allometric Equation CO_2 absorbed (Kg)	Reference
DR: Root Diameter (cm) & DBH: Diameter at Breast Height (cm)		
Rhizophora mangle	Biomass=10^(1.731*LOG10(DR)-0.112) Biomass=0.196*(1.05^(0.899))*(DR^2)^1.11	Adame, M. F., Kauffman, J. B., Medina, I., Gamboa, J. N., Torres, O., Caamal, J. P., Reza, M., & Herrera-Silveira, J. A. (2013). Carbon Stocks of Tropical Coastal Wetlands within the Karstic Landscape of the Mexican Caribbean. PLOS ONE, 8(2), e56569. https://doi.org/10.1371/JOURNAL.PONE.0056569
Laguncularia racemosa	Biomass=10^(1.930*log10(DBH-0.441) Biomass=0.196*(1.05^(0.899))*(DBH^2)^1.11	Adame, M. F., Kauffman, J. B., Medina, I., Gamboa, J. N., Torres, O., Caamal, J. P., Reza, M., & Herrera-Silveira, J. A. (2013). Carbon Stocks of Tropical Coastal Wetlands within the Karstic Landscape of the Mexican Caribbean. PLOS ONE, 8(2), e56569. https://doi.org/10.1371/JOURNAL.PONE.0056569
Avicennia germinans	Biomass=10^(1.934*log10(DBH)-0.395 Biomass=0.196*(0.90^(0.899))*(DBH^2)^1.11	Adame, M. F., Kauffman, J. B., Medina, I., Gamboa, J. N., Torres, O., Caamal, J. P., Reza, M., & Herrera-Silveira, J. A. (2013). Carbon Stocks of Tropical Coastal Wetlands within the Karstic Landscape of the Mexican Caribbean. PLOS ONE, 8(2), e56569. https://doi.org/10.1371/JOURNAL.PONE.0056569

Carbon stocks in planted trees and shrubs at year 40 were calculated by applying these allometric equations to the tree dimensions expected at age 40. The total carbon storage at year 40 for the 100,000 trees and shrubs is estimated to be 32,791.54 Tons of CO_2.

Due to natural ecological processes, a fraction of the planted trees and shrubs will die. The survival/mortality percentages were computed with two different approaches, as described in the following subsection.

III.1.5.3. CO_2 Capture

In reforestation efforts within degraded areas, trees are typically planted at a density of one every four meters (16 m² per tree) to ensure they have sufficient space to grow without excessive competition for essential resources like sunlight, water, and soil nutrients. Currently, the project has achieved a significantly higher density of 0.15 m² per tree, which may impact reforestation success. Proper management is crucial to balance tree density with resource availability, ensuring healthy development and long-term ecosystem sustainability.

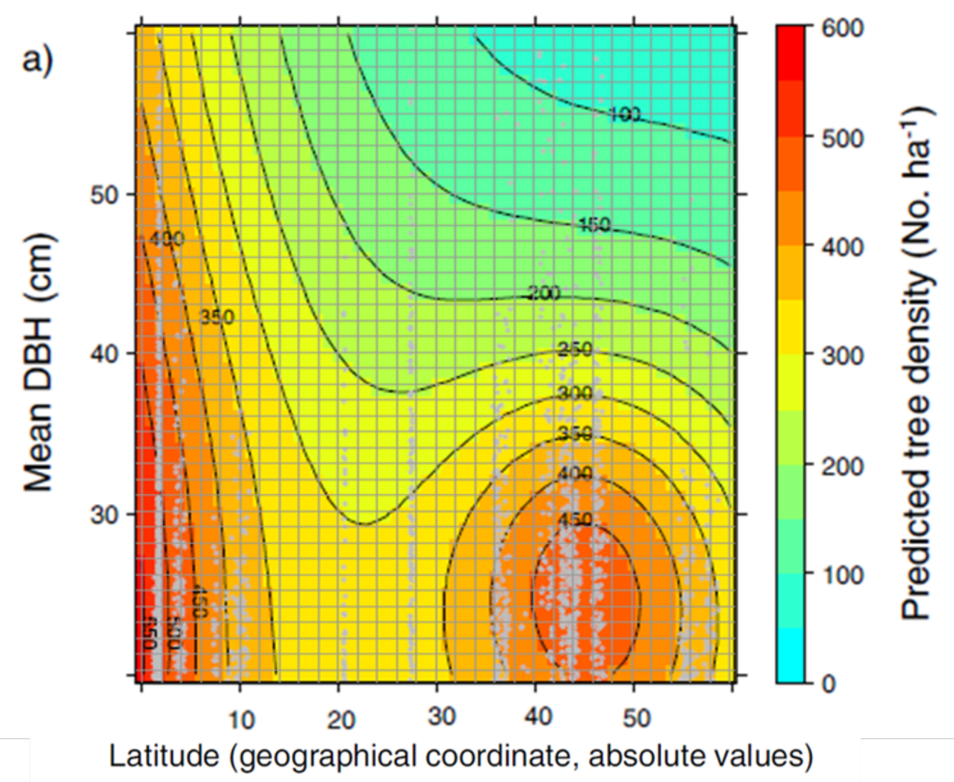
Mangroves, however, naturally grow in dense clusters, unlike traditional terrestrial trees. Their close spacing helps stabilize coastal sediments, reduce erosion, and enhance resilience against storms. Additionally, their specialized root systems allow them to access nutrients efficiently, even in high-density environments. Despite this natural adaptation, careful monitoring is necessary to maintain an optimal balance that supports both growth and ecosystem health.

III.1.5.3.1 Survival rate based on forest tree density.

Tree density as a function of mean DBH and latitude.

The estimation of survival rate is based on the results from Madrigal-González et al. (2023). These authors established the relationship between mean Diameter at Breast Height (DBH) and latitude in determining forests' tree density (Figure 6).

According to this reference, predicted tree density for an area located at latitude 18.35°N, and with a mean tree diameter of 20.23 cm is around 300 trees per hectare. Considering that the field visit revealed a tree density of 1,667 trees per hectare, a survival of 17.99% would lead to the density of 300 trees ha-1, as proposed by Madrigal-González et al. (2023).



Source: Madrigal-González et al. (2023), figure 2a.

FIGURE 6 PREDICTED TREE DENSITY AS A FUNCTION OF MEAN DBH AND LATITUDE. SOURCE: MADRIGAL-GONZÁLEZ ET AL. (2023).

Tree density according to timber plantation tables.

Cienciala et al. (2022) provided estimated survival rates considering tree mortality and management interventions across various biogeographic regions and species groups. For Continental Broadleaves, which was determined as the category with the most ecologically similar characteristics to mangroves for the purpose of this analysis, the authors reported a stand density of 1,579 trees per hectare at year 40 post-plantation. Given the restoration area's initial planting density of 1,667 trees per hectare, a survival rate of 94.7% would achieve the density reported by the authors.

In summary, the project currently has a density of 1,667 trees and shrubs per hectare, which will result in initial competition for resources. However, as is typical with reforestation projects, the expected mortality will reduce the planting density over time as the project stabilizes. The surviving trees will then have increased access to resources such as water, sunlight, and nutrients, allowing them to continue growing.

Based on the two density references, the project's survival rate at year 40 can be estimated under two scenarios: one with a 17.99% survival rate and the other with a 94.72% survival rate.

III.1.5.3.2. Carbon capture in vegetation

The carbon removal potential, calculated using the allometric equations, was adjusted to account for survival/mortality, as follows. Survival scenario 1, calculated from tree density predicted by Madrigal-González et al. (2023), results in survival of 17.99% of planted trees and shrubs. Therefore, 17.99% of the carbon removal potential equals 5,899.19 TCO_2-eq over the 40 years of the project. Survival scenario 2, calculated from tree density predicted by Cienciala et al. (2022), results in survival of 94.72% of planted trees and shrubs. Therefore, 94.72% of the carbon removal potential equals 31,060.14 TCO_2-eq over the 40 years of the project.

Considering these 2 scenarios, the amount of carbon removals the project can generate attributable to the planted trees and shrubs lies between 5,899.19 and 31,060.14 TCO_2-eq. However, it is important to note that this ex-ante estimation excludes carbon removals from vegetation that develops in the project area natural regeneration, triggered by Project activities. As the reforestation matures, it is expected that monitoring campaigns reveal carbon stocks higher than those estimated ex-ante. These estimates were and will continue to be cross-referenced with the maximum carbon removal determined through Net Primary Productivity (NPP) to ensure adherence to biophysical ecological limits, thus avoiding overestimates.

III.1.5.4. Carbon Credits

According to the *aOCP Methodology for the issuance of verified carbon credits for mangrove projects V1.0,* this ecological restoration project in Paraiso, Tabasco, Mexico spanning a total area of 1,919 hectares with an intervention area of 1146.5 hectares, including 100,000 planted mangrove trees, has the potential to generate between 5,899 and 31,060 Verified Carbon Credits (VCC) from removals. This range considers survival scenarios of 17.99% and 94.72%, as elaborated above. However, the inclusion of carbon capture and survivorship estimations proposed by the project developers will further refine these estimates and provide a more comprehensive assessment of the project's environmental impact.

The project developers estimated a survival rate of 80% by year 40; applying this survival rate to the initially aOCP-determined carbon capture yields 26,233.23 TCO_2-eq. Table 6 presents a summary of the considerations.

TABLE 6. ESTIMATED CARBON CAPTURE OF ECOLOGICAL RESTORATION PROJECT AT YEAR 40

Survival Scenarios			Carbon Capture (TCO_2-eq)	Carbon Credits (VCC)
aOCP Determined	Total Derived	100.00%	32,791.54	**32,791**
	Madrigal-González et al. (2023).	17.99%	5,899.19	**5,899**
	Plantation Tables	94.72%	31,060.14	**31,060**
	Project Developer expected survival	80.00%	26,233.23	**26,233**

To maintain a conservative scenario, 26,233 VCC will be generated from the project´s benefits. However, in accordance with de *aOCP Project Procedures* document, 30% of these will be allocated to the buffer pool as a reserve (7,870), leaving a total of **18,363 Verified Carbon Credits.**

A 20% post-project emission will be made, corresponding to **3,673 VCC**. Annually, the capture will be calculated based on the Dynamic review baseline, adjusting the number of credits as necessary and issuing the corresponding credits.

IV. RELEVANT SUSTAINABLE DEVELOPMENT GOALS

The 17 Sustainable Development Goals (SDGs), established by the United Nations in 2015, are essential in guiding restoration projects toward meaningful and enduring outcomes by addressing the interconnected nature of global challenges such as biodiversity loss, climate change, poverty, and social inequalities (https://sdgs.un.org/goals). Acting as a comprehensive framework, the SDGs enable project activities and their associated restoration and conservation efforts to align environmental, social, and economic objectives, ensuring that projects contribute not only to ecological recovery but also to broader sustainable development. By embedding these principles into restoration efforts, projects contribute not only to ecological recovery but also to the broader pursuit of sustainable development envisioned by the UN. Project initiatives can foster ecosystem resilience, support climate adaptation, enhance community livelihoods, and promote responsible resource use. This holistic approach acknowledges the intricate linkages between healthy ecosystems and human well-being, emphasizing that environmental restoration is also a pathway to achieving social equity and economic stability.

Moreover, aligning restoration projects with specific SDGs facilitates measurable progress, enhances accountability, and ensures the initiatives’ relevance within a global context. It also opens pathways to partnerships with stakeholders who share a commitment to these goals, from local communities and governments to international organizations and private entities. By adopting this approach, restoration projects can amplify their impact, making meaningful contributions to global sustainability targets. The following table (Table 8) highlights the SDGs most relevant to the project initiatives, illustrating how each goal serves as a guiding principle in shaping the strategies and ensuring the long-term success of the project.

TABLE 7 SUSTAINABLE DEVELOPMENT GOALS APPLICABLE TO THE PROJECT

SDG #	Goal	Positive Benefits / Indicator
8 DECENT WORK AND ECONOMIC GROWTH	***Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all***	The planned ecotourism initiative creates sustainable economic opportunities for local communities. Sustainable forest management provides long-term employment in conservation, monitoring, and reforestation activities.
13 CLIMATE ACTION	***Take urgent action to combat climate change and its impacts***	The restoration of mangrove ecosystems helps in carbon sequestration, reducing greenhouse gas concentrations and mitigating climate change. The project includes fire prevention and pest control measures, enhancing climate resilience by reducing the risks associated with extreme weather events.
14 LIFE BELOW WATER	***Conserve and sustainably use the oceans, seas and marine resources for sustainable development***	Mangroves serve as crucial breeding and nursery grounds for marine species, supporting biodiversity and improving fish populations. The project reduces coastal erosion and improves water quality, benefiting marine ecosystems and local fisheries.
15 LIFE ON LAND	***Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss***	Reforestation efforts with diverse tree species contribute to habitat restoration and increased biodiversity. Continuous forest management and conservation efforts ensure long-term ecosystem health and sustainability.

This project showcases a nature-based solution to environmental degradation, demonstrating how targeted reforestation and intentional ecological conservation can drive climate resilience, biodiversity restoration, and sustainable land use. By sequestering carbon and improving local ecosystems, it supports global sustainability efforts while delivering long-term ecological and community benefits.

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