INTEGRATED PROJECT FOR REFORESTATION AND AGROFORESTRY ON DEGRADED LANDS IN NICARAGUA

Document Prepared by Form International B.V.

Project Title	Integrated Project for Reforestation and Agroforestry on Degraded lands in Nicaragua
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CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Project

The proposed ARR VCS project plans to reforest a total area of 2,866 hectares (Ha) until 2030 in Nicaragua. Since 2016, 1,118 hectares of mainly teak (*Tectona grandis*) and, to a lesser extent, cocoa agroforestry systems (*Theobroma cacao*) have been realized (incl. 2020). This area was realized in the northeast of Nicaragua, in the Autonomous Region of the North Caribbean Coast (RACCN), specifically in the municipalities of Siuna and to a minor extent in Bonanza and within the limits of the buffer zone of the BOSAWAS Biosphere Reserve (RBB), approximately 315 km from the capital of the country Managua. The realized plantations form the first instances of this grouped project. The project foresees a gradual expansion of planted area starting with 100 to 200 hectares per year, adding new project areas to the project within the same area of the RACCN, Nicaragua.

The Project was born in 2008 Bonanza, as a reforestation initiative of the mining company HEMCO de Nicaragua, and was managed by Norteak Madera until 2015. Since middle 2015 MLR took the management control of the Project with a different vision, focused on an agro-forestry project combining teak and cacao crops.

The Project plans to reforest a total area of 2,866 hectares (Ha) until 2030, mainly in the Municipality of Siuna, according to the availability of area, labor and other necessary elements, that allow the expansion of the Project in degraded areas. Furthermore, from 2020 onwards, the project manages assigned protection areas for gradual rehabilitation into natural lands, specifically in those areas that have suffered high levels of degradation, and a planned 4,503 ha of project areas under management is foreseen by 2030.

The land areas reforested are established on former degraded pasture lands. These lands have suffered deforestation and soil degradation due to land-use change processes in the previous century, principally for the purposes of extensive traditional cattle grazing, subsistence agriculture in which the practices of slash-and burn agriculture prevailed, and to a smaller extent subsistence mining activities.

MLR's purpose is to restore these degraded lands with a commercial timber species and high-productive cacao cultures with fine aromas, in an agro-forestry system setting. MLR has been able to attract a variety of foreign investors in a remote and relatively abandoned region of the country. The company holds an FSC certificate for its forest management, a third-party certification scheme which certifies that the forest is sound and sustainably managed.

For the cacao plantations, these have been certified under the UTZ-Rainforest Alliance Certificate program, which covers and guarantees good agricultural practices and proper harvest management, social and living conditions and the environment.

To align the social and environmental performance of the Project with other applicable international standards, MLR has voluntarily assumed the incorporation of the 8 Environmental and Social Sustainability Standards of the International Finance Corporation (IFC, 2012).

The project has a net-positive carbon impact (sequestration) through the increase of carbon biomass through the growth of its timber and agroforestry plantations and avoidance of deforestation of remaining forest patches on its land areas. All riverbeds and frequented inundated areas are protected. Deforestation rates and threats in the region are high, both Bonanza and Siuna are considered deforestation hotspots at national level [1]. Furthermore, the site has a history of encroachment and soil degradation for mining purposes – the area is rich in both gold and silver.

The present project will sequester an annual average of 29 287 tons of CO_2e during the project period of 40 years.

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.

1.3 Project Eligibility

The project has a net-positive carbon impact (sequestration) through the increase of carbon biomass through the growth of its timber and agroforestry plantations and restoration of degraded forest land areas. The project activity is supported by a CDM methodology, and is therefore eligible as methodology for this VCS project. The project activity is not listed as excluded activity under the scope of the VCS program.

1.4 Project Design

The project is designed as a grouped project. The reason is that the project covers multiple locations in 2 municipalities (Siuna and Bonanza) and is foreseen to grow in the future.

Eligibility Criteria

Will be included in final report

1.5 Project Proponent

Organization name	MLR Forestal de Nicaragua S.A.
Contact person	S.D. Rios Molina

Title	CEO
Address	Primera Entrada a Las Colinas, 2 ½ c al este. Managua, Nicaragua
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1.6 Other Entities Involved in the Project

Organization name	Form International B.V.
Role in the project	Project developer
Contact person	R. Sools
Title	Technical Director
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1.7 Ownership

MLR Forestal de Nicaragua (MLR, hereinafter) has legal land ownership titles for all project areas. These lands were mostly acquired from the former landowner, HEMCO, however, many others were later acquired directly by MLR from other owners in the area, especially in Siuna.

The properties are based in 2 districts, Siuna, which consists of 13 farms (4,859.32) and Bonanza (269.56 ha), consisting of 3 farms.

In 2015, the company established a land acquisition protocol which contemplates criteria for the selection, negotiation and acquisition of new properties, including environmental, social, and land-use criteria and the respective procedures for acquisitions processes. There is a legal department in charge of verifying that the properties meet all legal requirements.

Currently, the ownership encompasses 56 land use titles, and covers 5,128.88 hectares. The forest stands are fully owned by MLR, and since middle 2015 also under direct management of MLR.

1.8 Project Start Date

01-04-2016

The project start date is the date on which activities that lead to the generation of GHG emission removals are implemented, specifically land preparation and planting. The execution of the on-the-ground plantation establishment started in April 2016 [2], as such the start date of the project was defined at 01-04-2016.

1.9 Project Crediting Period

Start date: 01 - 04 – 2016

End date: 31 - 03 - 2056

Total number of years: 40

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
2016	0
2017	6 484
2018	11 263
2019	11 715
2020	41 842
2021	84 426
2022	85 904
2023	79 248

2024	66 426
2025	59 398
2026	55 332
2027	51 092
2028	55 023
2029	66 118
2030	59 900
2031	52 356
2032	53 927
2033	51 665
2034	43 526
2035	32 082
2036	28 730
2037	22 662
2038	22 353
2039	15 441
2040	9 592
2041	9 197
2042	8 837
2043	8 507
2044	8 140
2045	7 796

2046	7 473
2047	7 105
2048	6 754
2049	6 418
2050	6 220
2051	6 034
2052	5 859
2053	5 695
2054	5 539
2055	5 392
Total estimated ERs	1 171 471
Total number of crediting years	40
Average annual ERs	29 287

1.11 Description of the Project Activity

GHG emission removals are achieved by establishing (agro)forestry plantations and by restoring natural forest in protection areas. Three different reforestation (or rehabilitation) types are identified (see also the table below): teak plantation (I), plantations with a mixture of teak and cacao (II), and (III) protection areas in which the natural forest is restored.

The different reforestation types are elaborated on below. All these project activities are carried out and monitored according to the CDM consolidated methodology AR-ACM0003: Afforestation and reforestation of lands except wetlands --- Version 02.0.

The company is projecting the expansion of its Project productive planted areas to a total of 2,866 productive hectares and a total project area size of 4,503 ha. The company has put sustainability goals in the area of carbon capture, promotion of fauna through established corridors, the promotion of formal employment opportunities, equal opportunities to women and the contribution to the fight against deforestation and forest degradation [2, 3].

The company has put a social, environmental, health and security management system in place in 2019, to positively impact social and environmental areas, reduce risks and contribute to the regional economic development [2].

In the region where the project is located a jurisdictional REDD+ program is under development, but this is not implemented yet [4, 5].

Table 1 Project area characterization 2016 - 2020

Reforestation type	Bonanza area (ha)	Siuna area (ha)	Total area (ha)
Teak plantation (I)	0,00	943,46	943,46
Teak + cacao plantation (II)	73,08	101,18	174,26
Protection (III)	88,86	1367,81	1456,67
Total	161,94	2412,45	2574,39

1.11.1 Teak plantation (I)

The main species used in the project's forest plantations is Teak (*Tectona grandis*). Teak is native to India, Myanmar, the Laos and Thailand, and is naturalized in Java, Indonesia, where it was introduced about 400 to 600 years ago [6, 7]. Teak was first introduced in Central America in 1926 at the Summit Botanical Garden in Panama [8], after which it has been planted in nearly all tropical American countries including Nicaragua [9].

Teak grows best in warm, moderately moist tropical conditions with rainfall between 1400-2500mm, a 3 to 5-month dry season, and below 1000m above sea level [10, 11]. Teak is a deciduous hardwood tree that can reach heights over 50m in its place of origin, and in Central America it can reach heights over 30m [10]. In the past decades, teak has become one of the most important tropical hardwood plantation species [7]. Teak is highly valued for its physical and aesthetic wood properties, and the increasing demand for quality timber and declining supply from natural forests have led to an increase in the development of teak plantations [6, 12].

The environmental impact of sustainable teak production is low. It is planted on deep and level soils which are relatively insensitive to erosion, and the teak is not planted in the river buffer zones or other ecologically valuable areas. No chemical treatments are required for pest control, because of the low susceptibility of teak to diseases. Therefore, no ecological damage is caused to the environment. Also, the spread of teak outside the plantation can easily be controlled, since dispersal distance of teak seeds is limited. Teak cannot invade areas with dense (high grass) vegetation without human interference because it is a high light demanding species. Most areas surrounding the plantation are in agricultural use for which teak poses no threat.

Figure 1 - Teak plantation (source: MLR Forestal)

Experience with the silviculture of teak plantations started in the 19th century [13] and this longstanding practice has resulted in sound management guidelines and good yield prognoses. This provides a solid technical basis for plantation establishment. Teak plantations of MLR Forestal are managed as even-aged stands with a rotation cycle of 20 year and four intermediate thinnings [11]. This choice is based on economic and silvicultural considerations. Following VCS requirement 3.2.21, carbon removals due to harvesting are appropriately accounted for by claiming a maximum amount of sequestered carbon equal to the project's long-term average CO_2 sequestration.

1.11.2 Mixture teak with cacao (II)

The project involves the establishment and maintenance of agroforestry plantations on degraded and deforested lands. These plantations consist of a mixture of teak (Tectona grandis) and cacao (Theobroma cacao), where cacao beans are regularly harvested and an additional revenue stream is generated from the teak [14].

Cacao needs a specific amount of cover to provide the shade that cacao needs to have a balanced metabolism [1]. Because of the high levels of rainfall in the project area the teak does not drop leaves in the drier season, which makes teak highly suitable to function as permanent shade tree [14]. By using teak, with its high commercial wood value, the project can benefit from the entire process from management to commercialization of the agroforestry plantation [14]. The teak is established in rotations cycles of 20 years and the logs from thinnings and harvests are further commercialized.

Cacao (*Theobroma cacao*) is a small evergreen tree/plant native to the deep tropical regions of Mesoamerica as an understorey plant, and is now cultivated all across the lowland tropics.

Figure 2 - Agroforestry plantations with a mixture of teak and cacao (source: MLR Forestal)

Cacao is usually found below 300m of altitude, but can also be found at 900m [15] best with temperatures between 18 and 28.5 degrees Celsius, with a maximum temperature of 30-33.5 degrees Celsius. Optimal rainfall is between 1,500-2,000 mm per/year, however, the maximum is 3,000 mm/year, evenly distributed throughout the year. best with temperatures between 18 and 28.5 degrees Celsius, with a maximum temperature of 30-33.5 degrees Celsius. Optimal rainfall is between 1,500-2,000 mm per/year, however, the maximum is 3,000 mm/year, evenly distributed throughout the year. best with temperatures between 18 and 28.5 degrees Celsius, with a maximum temperature of 30-33.5 degrees Celsius. Optimal rainfall is between 1,500-2,000 mm per/year, however, the maximum is 3,000 mm/year, evenly distributed throughout the year. best with temperatures between 18 and 28.5 degrees Celsius, with a maximum temperature of 30-33.5 degrees Celsius. Optimal rainfall is between 1,500-2,000 mm per/year, however, the maximum is 3,000 mm/year, evenly distributed throughout the year. best with temperatures between 18 and 28.5 degrees Celsius, with a maximum temperature of 30-33.5 degrees Celsius. Optimal rainfall is between 1,500-2,000 mm per/year, however, the maximum is 3,000 mm/year, evenly distributed throughout the year. best with temperatures between 18 and 28.5 degrees Celsius, with a maximum temperature of 30-33.5 degrees Celsius. Optimal rainfall is between 1,500-2,000 mm per/year, however, the maximum is 3,000 mm/year, evenly distributed throughout the year. Cacao requires fertile, moisture-retentive but well-drained soil, with sun or partial shade.

Cacao can reach a height of about 4 to 8 m, and exceptionally of 20 m. The plant is part of the family Malvaceae. Cacao has a short bole of about 20-30 cm in diameter. The growth rate of cacao is medium, rarely growing more than 1.5 m tall after 2 years [16].

The management applied by MLR Forestal is defined in its Cacao Management Plan [14], and includes descriptions and directions from site preparation, establishment, maintenance up to disease control and harvest and post-harvest practices.

The environmental and social impact of cacao cultivation has been evaluated in the Cacao Management Plan, and identified and rated impact on water sources, soils, vegetation, fauna, ecological processes, landscape, social-cultural, social-political and demographic components. It is concluded that the cacao cultivation does not cause major environmental impacts during its planting, maintenance and harvest. No risks of erosion is present at establishment due to

minimal soil disturbance and absence of irrigation systems. Furthermore, it is shown that there are numerous positive socio-environmental impacts, including flora and fauna conservation (native birds, micro-flora and fauna), landscape preservation, job creation and strengthening the agricultural cooperatives & organization [14].

A plantation design of a typical teak-cacao mixture is provided below.

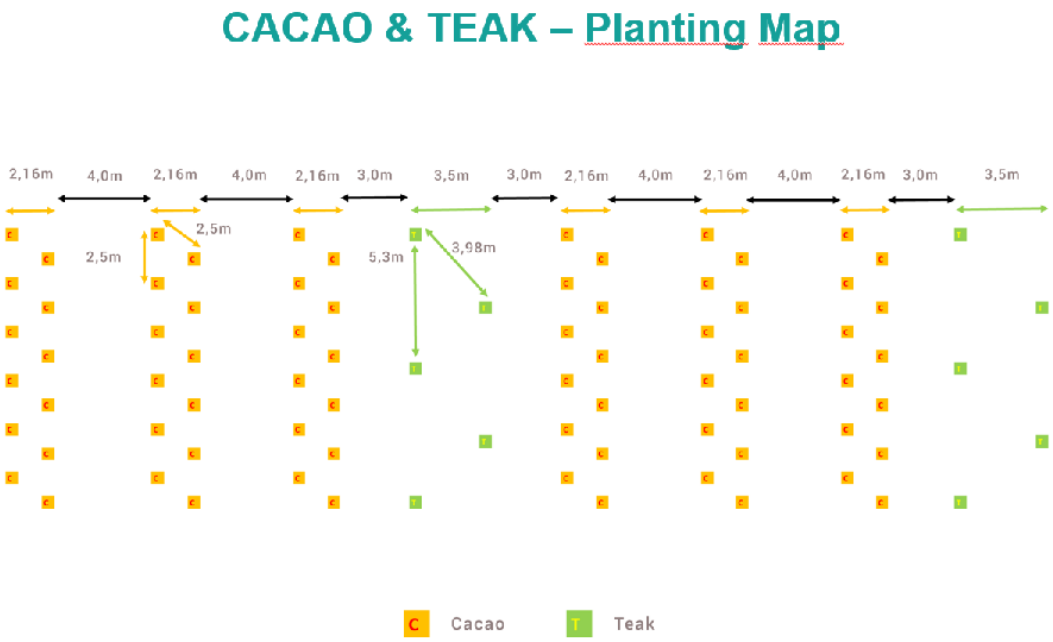


Figure 3 - Cacao & teak planting design

1.11.3 Protection (III)

The fallow areas within the project area were not managed after the land management was taken over by MLR Forestal. An independent study [17] confirmed that the project area was severely degraded and deforested. It was however also concluded that reforestation by MLR can function as a sustainable system to facilitate (1) the recovery of forest cover, (2) the conservation and recovery of degraded soils, (3) the prevention of illegal extraction of wood from critical habitats of conservation, (4) the protection of water resources, and (5) the protection of flora and fauna. Therefore, in 2020 a process was started to actively manage these areas as protection area to restore the natural functioning of the areas, contemplated in MLR's Protection area & Biodiversity management plan [18].

In general, the protection areas set aside when they contain remnant forest or are located in areas that have no commercial value such as steep areas. But in land use planning it is sought to locate the different protection areas in such a way that they form biological corridors for flora and fauna [11]. Therefore, before the project implemented management activities the area consisted of a mixture of pasture land with some scattered trees remaining, abandoned pasture land with shrub regrowth and remnant trees ('tacotales') and remnant forest. Tacotales

are abandoned pasture lands where shrub and tree regrowth have taken place in recent years. This land is known locally as 'tacotales', and is defined as 'young vegetation, dense shrubs and/or secondary regrowth' [19].

In 2020 an inventory was carried out based on a new-developed procedure for characterization of protection areas [20]. Incorporating this characterization, a process was started for updating the Protection area & Biodiversity Management Plan for these protection areas. The specific management activities depend on the baseline vegetation, while protection against illegal activities applies in all protection areas. In line with objectives set out in the management plan, enrichment planting has started in 2020 in 3 operations on 2 different properties (Matiz and Waspado) in fallow areas with high potential for landscape restoration [21], and takes place annually.

The plan further sets out activities to establish informative and educational signs boards at principle access points of each of the properties, as well as in the camps and at the protection sites. These sign boards also inform about the company directives applicable in such area, such as prohibition to enter the area (unless for educational, monitoring or enrichment activities), avoidance of noise creation, etc. Further, the plan contains specific directions on flora and fauna monitoring, the latter includes reptiles, amphibians and mammals. Recent monitoring reports show presence of 5 amphibian species, 29 reptile species, 15 mammal species and 185 bird species. In total 51 species of flora and fauna species are classified as vulnerable or protected by national or international conventions (e.g. CITES) [22]. An academic journal article on butterfly presence in MLR's properties, noted the existence of 72 butterfly species in the Siuna project region [23].

Figure 4 Patch of degraded remnant forest in the protection area (source: MLR Forestal)

1.12 Project Location

The project location and geographic boundaries of the teak plantations, teak and cacao plantations and protection areas are shown in Figure 5, Figure 6 (map of Siuna) and Figure 7 (map of Bonanza). The maps also show infrastructure and some of the roads. The project sites are located in the district of Siuna and Bonanza in Northeast Nicaragua, and the sites are therefore called Siuna and Bonanza, respectively. Bonanza is located at approximately 14°01′N 84°35′W and Siuna at approximately 13°44′N 84°46′W. The exact coordinates of the project locations are visible on the maps.

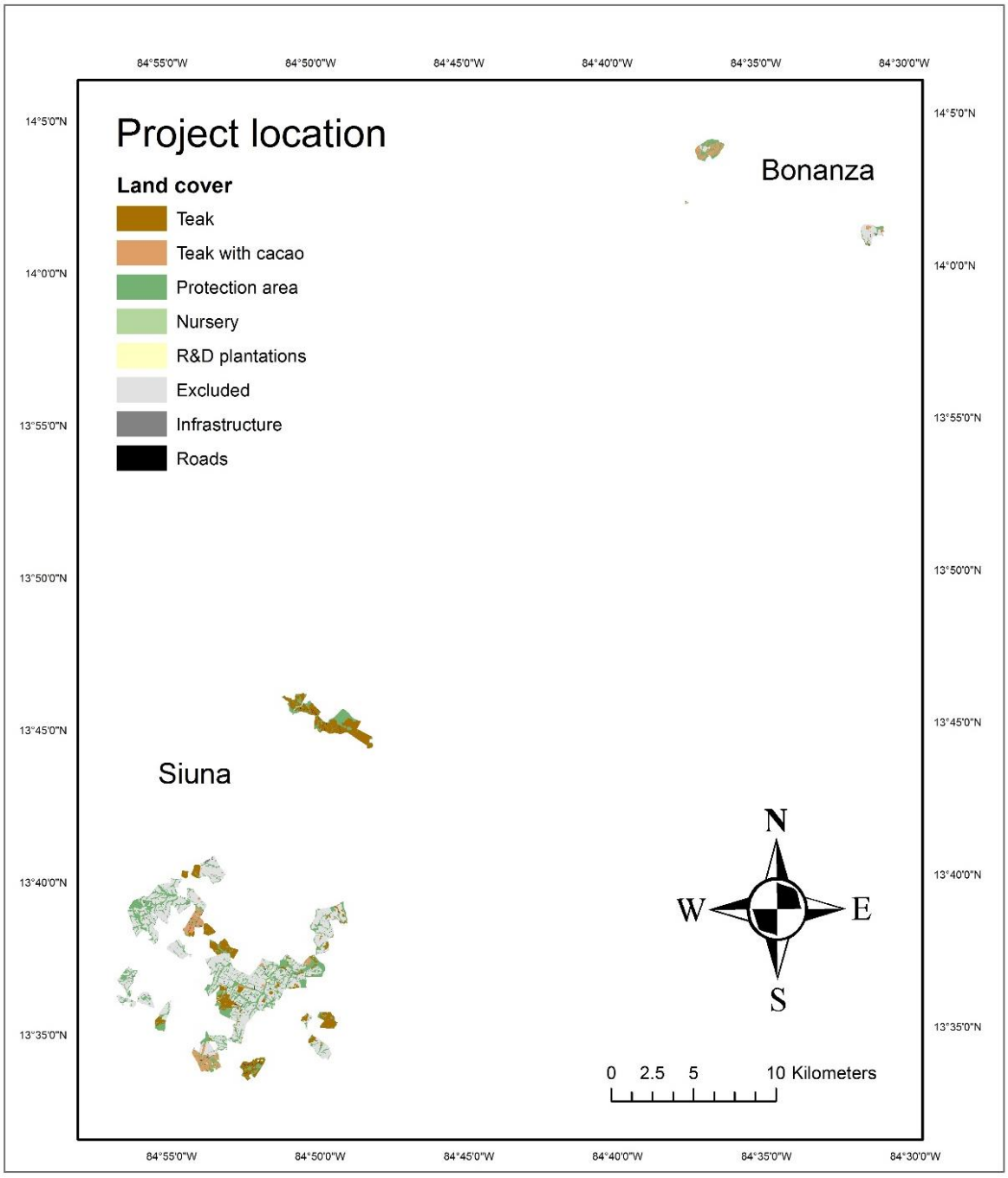
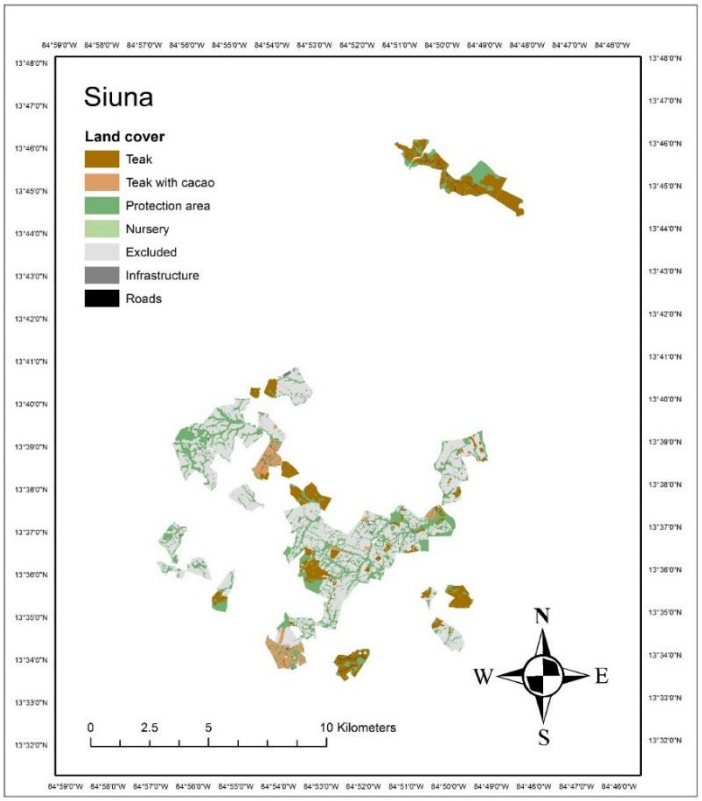
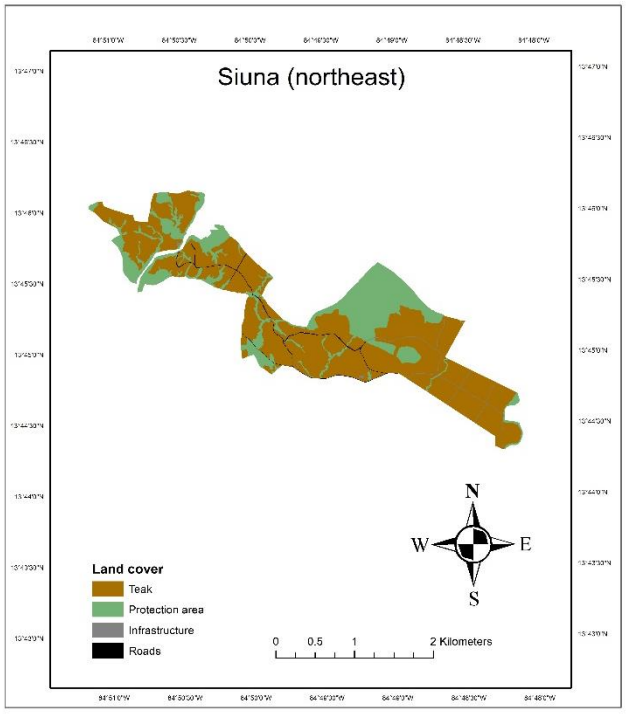


Figure 5 - Location of project sites in the districts of Siuna and Bonanza with indication of land cover, geographic boundaries and geodetic coordinates





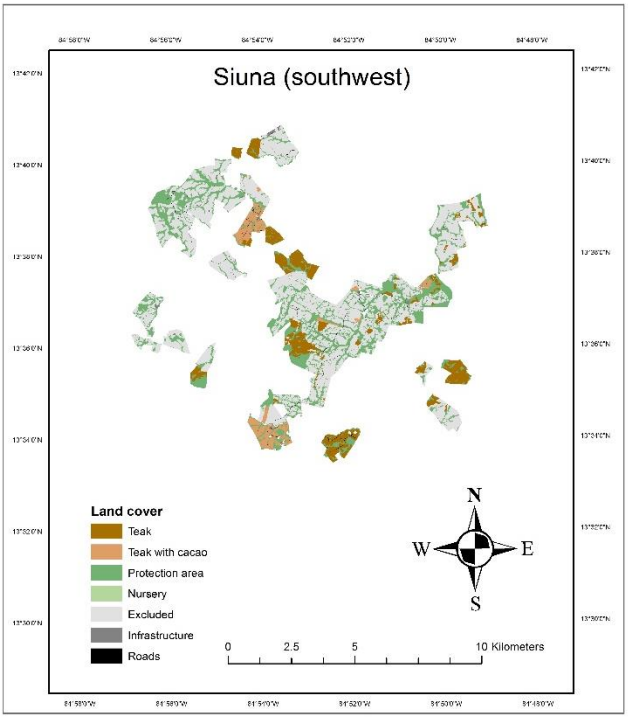


Figure 6 - Siuna project areas in Siuna municipality. Above: overview map; below: Siuna northeast & Siuna southwest

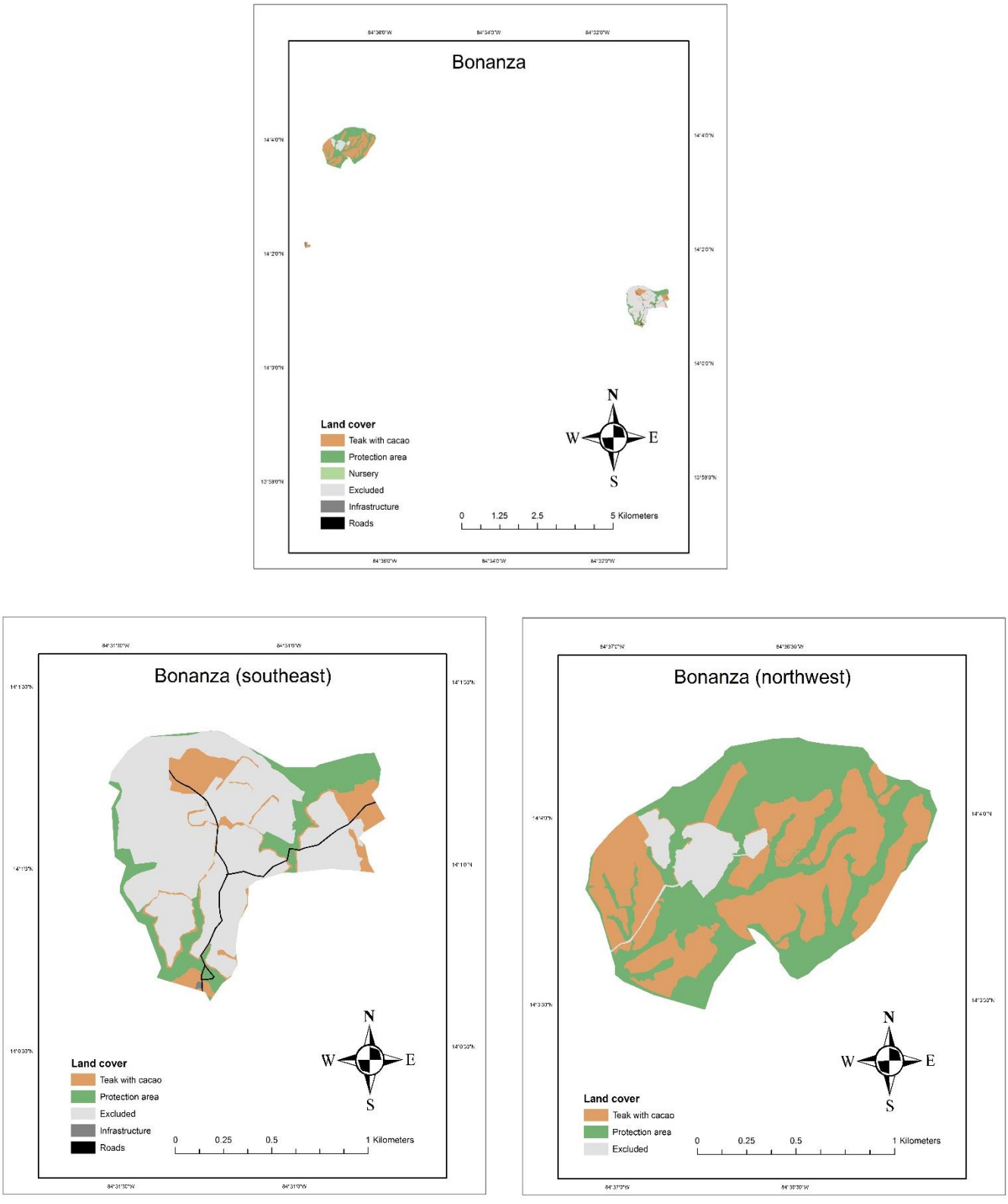


Figure 7 - Bonanza project areas in Bonanza municipality. Above: overview map; below: Bonanza southeast & Bonanza northwest

1.13 Conditions Prior to Project Initiation

The project has not been implemented to generate GHG emissions for their subsequent reduction or removal, as the area was already degraded prior to the project start. The conditions prior to project initiation are described below.

Climate

The project area is characterized by a humid tropical climate, with high levels of rainfall. Rainfall in the area varies between 2,000 and 3,000 mm, with a peak in September. The dry season occurs between the months of May to July. The average temperature in the region is around 28ºC, with generally April having the highest temperatures reaching 32ºC, and December having the lowest temperatures reaching to 23ºC [23, 24].

Topography

Most of the project area can be characterized as undulating to moderately undulating land with good drainage. In 85% of the lands the altitude ranges between 100m and 250m above sea level, and the remaining 15% of the project area represents higher land, with hills and low mountains [24].

Soils

The major soil type in the project area is that of the Ultisols, commonly known as red clay soils. Ultisols represent 100% and 81.1% of the territory of Bonanza and Siuna respectively. Ultisols are soils from humid temperate to tropical zones on old weathered surfaces. Ultisols are the more highly leached forest soils having less than 35% base saturation, contrary to the Alfisols, which is soil type of the remainder of the project area. Alfisols are mineral soils that are typically found under a hardwood forest cover. They have a clay-enriched subsoil and relatively high native fertility. Alfisols have undergone only moderate leaching, and have by definition at least 35% base saturation. [24, 25].

Hydrography

The project area is mainly located in the Prinzipolka watershed, with a small portion of the project area being located in the Rio Coco watershed. Several smaller rivers and streams run through or are close to the project area. Some of these streams serve as a source of water for the local population, although the surface waters are considered contaminated due to anthropogenic activities [24].

Vegetation

Nicaragua is characterized by having diverse life zones, with the subtropical humid forest and a portion of the tropical dry forest being the predominant ecosystems in the project area [24]. The project area is located within the limits of the buffer zone of the Reserva de Biosfera

Bosawás (RBB), which is one of the most extensive nature reserves in Central America, covering 15% of the Nicaraguan territory [24].

At the beginning of the last century, primary forests prevailed in the project area, where traditionally the producer carried out a slash-and-burn system, to replace the forest and establish extensive livestock activities and small-scale subsistence agriculture [11]. As a result of decades of human induced land degradation, the natural vegetation of the project area is severely degraded. The Autonomous Region of the Caribbean Coast of the North Atlantic (RACCN) has faced a loss of tree cover of approximately 388 thousand hectares in the period from 2001 to 2016. This accounts for 35% of the loss of tree cover at the national level, of which the municipalities of Siuna (34%) and Bonanza (10%) are main contributors [26] as these municipalities are seen as hotspots of deforestation [27]. Most of the area is currently characterized as pasture and farmland, while most of the natural forest has disappeared. Currently only remnants of disturbed riparian forests are observed and some scattered groups of mature trees representing secondary, transitional forests, with trees easily exceeding 20 - 30 m in height [24]. Without the proposed reforestation project, the area would remain degraded or degrade even further due to agricultural activities and logging of the last remaining trees.

Figure 8 - Aerial image of a "typical degraded land" where MLR plants. Observe exposed soils, scattered trees and grasslands of very low productivity.

Portions of the project area were already planted with cacao before project initiation (2016). These, often old and poorly managed cacao stands, have a low carbon stock on degraded soils and consequently a low productivity. Without the project carbon stock would remain low and soils would further degrade.

An analysis was made of the land use systems of the MLR properties in the Siuna and Bonanza municipalities [28]. This analysis shows that the area was already deforested long before the project started. Figure 9 and Figure 10 show the land use in 2003 and 2020, and the imagery and corresponding analysis demonstrates that the area was already deforested long before the project started.

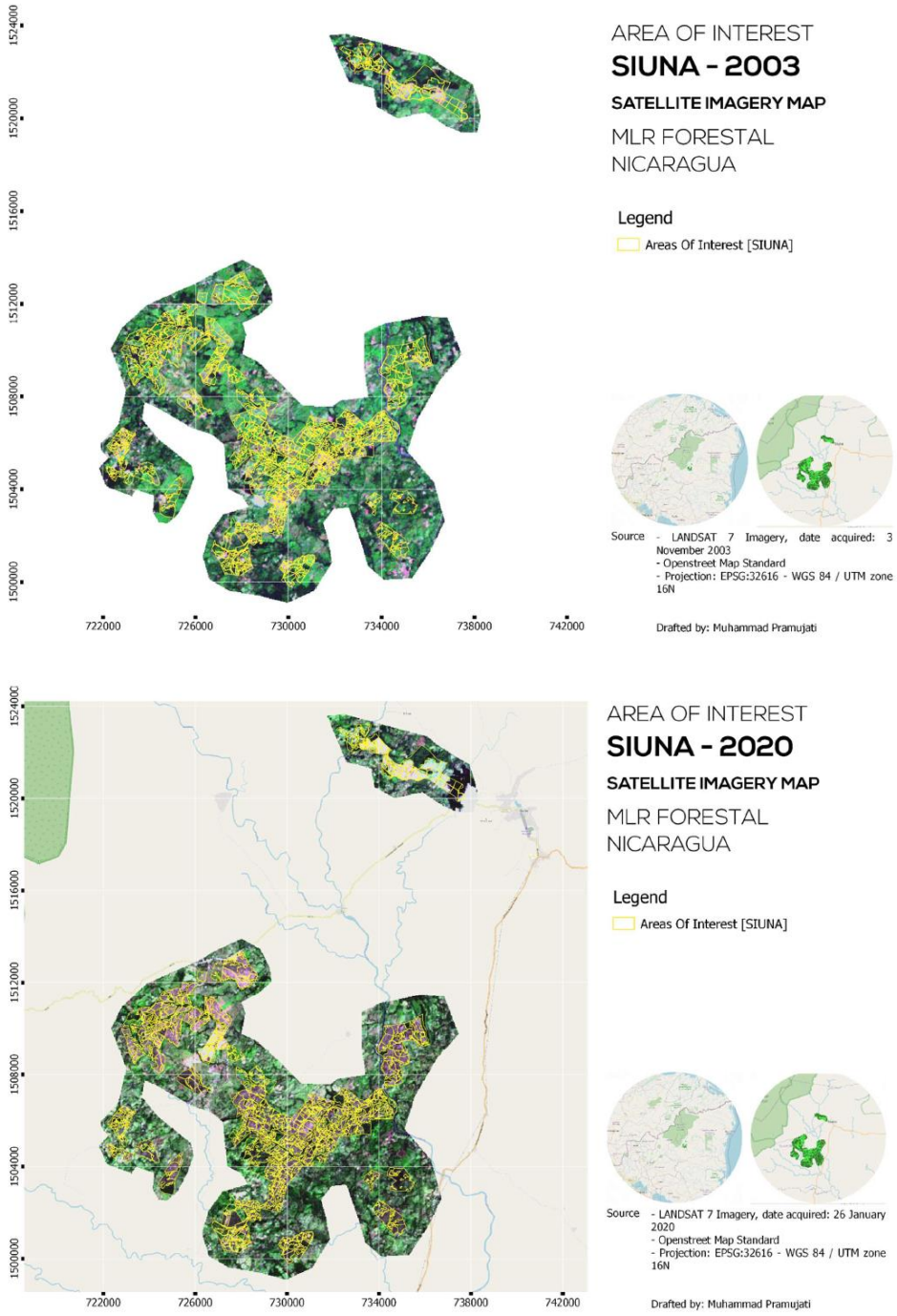


Figure 9 - Land use analysis for 2003 and 2020 (Siuna)

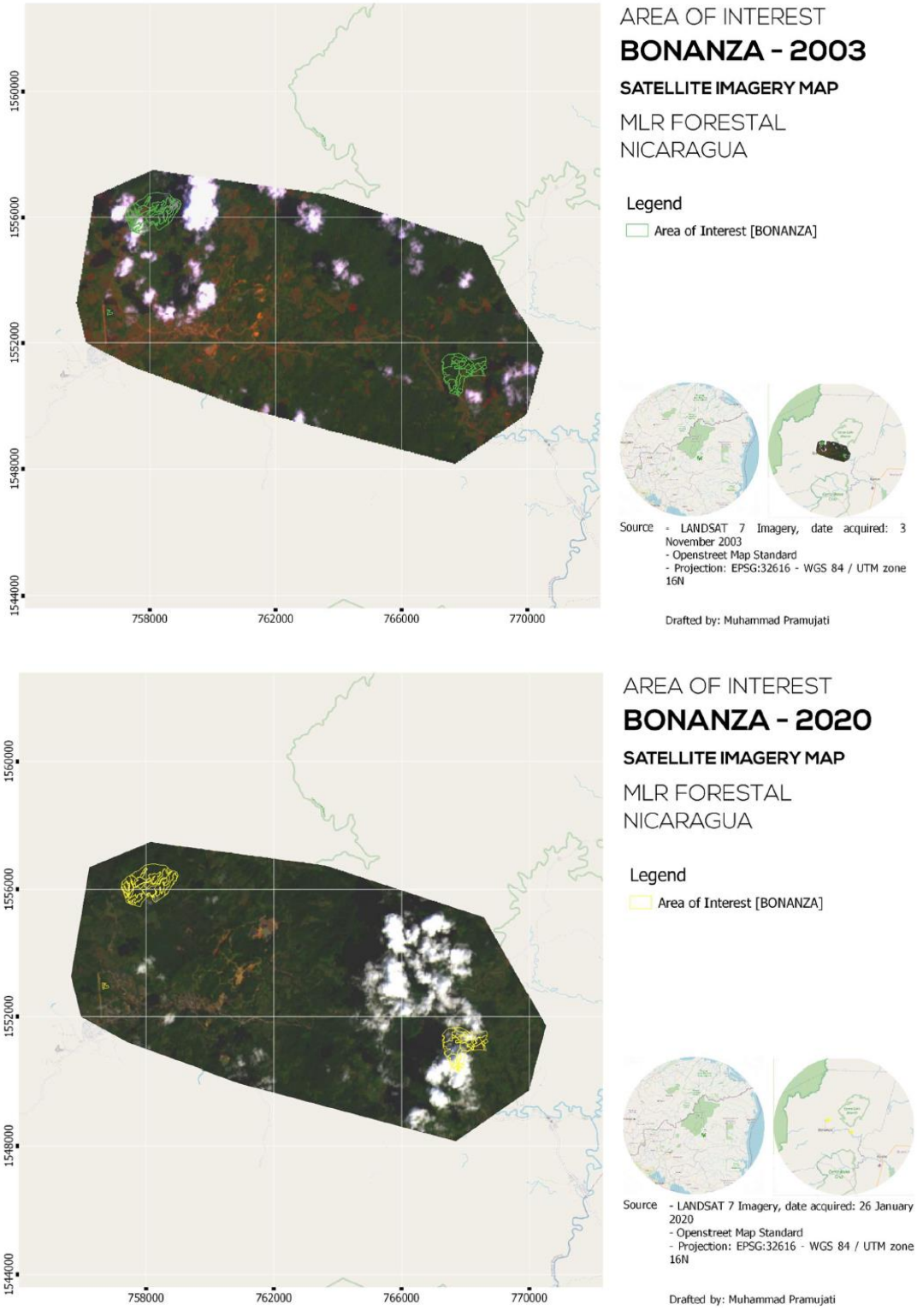


Figure 10 Land use analysis for 2003 and 2020 (Bonanza)

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

MLR Forestal de Nicaragua S.A. ('MLR Forestal', hereinafter) is a legally registered company in the country of Nicaragua, its constitution subscribed in the public registers for persons, real estate and commercial property[1]. MLR adheres to strict compliance with all laws, statutes and regulatory frameworks in Nicaragua, that apply to the company, including international conventions. Compliance with these laws and regulations is i.a. part of the annual FSC audits. Changes in legislation are registered and the company makes sure that legal compliance is maintained.

As forestry enterprise, MLR is subject to the Forestry Sector Laws, especially Act 462 [29] its regulations, Decree 73-2003 and other forestry sector regulations.

Pursuant to Law 462, the establishment, maintenance, thinning and exploitation of plantations do not require any permit, however they must be registered. Therefore, MLR Forestal is registered in National Forestry Institute (INAFOR) as a forestry company and all its plantations have a registration certificate in compliance with article 24 of Act 462,

It also has a Forestry Initiative approved by INAFOR in 2014, which will allow it to make use of some tax benefits established in the Law according to article 38 of Act 462.

Furthermore, the company obtained different permits issued by competent authorities to carry out its operation, among these: Environmental Authorizations for some operational activities, registry and authorization for the use of groundwater (water wells), the required Hygiene and Labour Security License which guarantees adequate worker conditions from the Ministry of Labour, and the Authorization of the Technical-Organizational Regulation No. 176-2018, issued by the same Ministry.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been registered nor is seeking registration under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG program.

1.16 Other Forms of Credit

[1] Libro de Personas del Registro Público de la Propiedad Inmueble y Mercantil: Escritura N° 26 de Constitución de Sociedad Anónima y Estatutos, autorizado en Managua a las 9:00 am del 13 de diciembre de 2010 por el notario Álvaro Martín Peralta Gadea, inscrita con el No. 40, 927-B5, Pag. 76-95, Tomo: 1119-B5 de Libro Segundo de Sociedades y con No. 36934, pág. 26/27 tomo 185 del Libro de Personas

1.16.1 Emissions Trading Programs and Other Binding Limits

Not applicable.

1.16.2 Other Forms of Environmental Credit

Since the project involves reforestation, no other credits than the VCU are aspired by the project proponent. The project's FSC and UTZ certification will not generate environmental credits.

1.17 Additional Information Relevant to the Project

Leakage Management

Will be included in final report

Commercially Sensitive Information

Will be included in final report

Sustainable Development

Will be included in final report

Further Information

Will be included in final report

2 SAFEGUARDS

2.1 No Net Harm

Will be included in final report

2.2 Local Stakeholder Consultation

Will be included in final report

2.3 Environmental Impact

Will be included in final report

2.4 Public Comments

Will be included in final report

2.5 AFOLU-Specific Safeguards

Will be included in final report

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The CDM consolidated methodology AR-ACM0003: Afforestation and reforestation of lands except wetlands --- Version 02.0 is applied.

In addition, the following tools are applied by the project:

- Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities (Version 01)
- Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2)
- Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity (Version 02.0)
- Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities (Version 01.1.0)

3.2 Applicability of Methodology

This section provides evidence that AR-ACM0003 version 02.0 is applicable. According to the methodology's section 2.2 Applicability, the methodology is applicable if the following conditions are met:

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

There are no wetlands within the project boundary [24].

b) Soil disturbance attributable to the project activity does not cover more than 10 per cent of area in each of the following types of land, when these lands are included within the project boundary:

(i) Land containing organic soils;

Amongst the encountered soil series (Ultisols and Alfisols), no organic soils are present within the project boundary [24].

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

The project area is characterized as degraded pasture land and, in areas closer to population centers, this is combined with subsistence farming [24].

The lands of Appendix 1 refer to cropland in which soil disturbance is restricted. Farming in the area is characterized as small-scale subsistence farming [24], which is characterized as

cultivation with reduced tillage and limited use of inputs. Therefore, the project area does not classify as land listed in Appendix 1.

The lands of Appendix 2 refer to grassland in which soil disturbance is restricted. Grasslands in the project area are used for extensive livestock ranching activities and without the use of inputs [11]. Therefore, the project area does not classify as land listed in Appendix 2.

3.3 Project Boundary

The selected carbon pools and emission sources in the project methodology and the justification or explanation for the inclusion or exclusion of different pools are outlined in the following table.

Source		Gas	Included?	Justification/Explanation
Baseline	Above-ground biomass	CO_2	Yes	Major carbon pool in the baseline and project activity
	Below-ground biomass	CO_2	Yes	Major carbon pool in the baseline and project activity
	Soil Organic Carbon	CO_2	No	This is estimated as an annual increase over 20 years according to the applicable tool and therefore only included in the project and not in the baseline.
	Dead wood	CO_2	No	Because of the reforestation project activity, dead wood can be expected to increase in the project scenario compared to the baseline scenario. However, this carbon pool is conservatively neglected.
	Litter	CO_2	No	Because of the reforestation project activity, litter can be expected to increase in the project scenario compared to the baseline scenario. However, this carbon pool is conservatively neglected.
Project	Above-ground biomass	CO_2	Yes	Major carbon pool in the baseline and project activity
	Below-ground biomass	CO_2	Yes	Major carbon pool in the baseline and project activity
	Soil Organic Carbon	CO_2	Yes	A significant increase in this carbon pool is expected due to the project activity.

Source		Gas	Included?	Justification/Explanation
	Dead Wood	CO_2	No	This carbon pool is conservatively neglected.
	Litter	CO_2	No	This carbon pool is conservatively neglected.
Project	Burning of woody biomass	CO_2	No	Fire is not used as a management tool for land preparation.
		CH_4	No	Fire is not used as a management tool for land preparation.
		N_2O	No	Fire is not used as a management tool for land preparation. Increase of GHG emissions due to displacement of pre-project agricultural activities.
	Leakage	CO_2	Yes	Increase of GHG emissions might occur due to displacement of pre-project agricultural activities.
	Fossil fuel	CO_2	No	The use of fossil fuels is not included following chapter 5.5 of the methodology.

In the following figure, the project boundaries are indicated as well as land use.

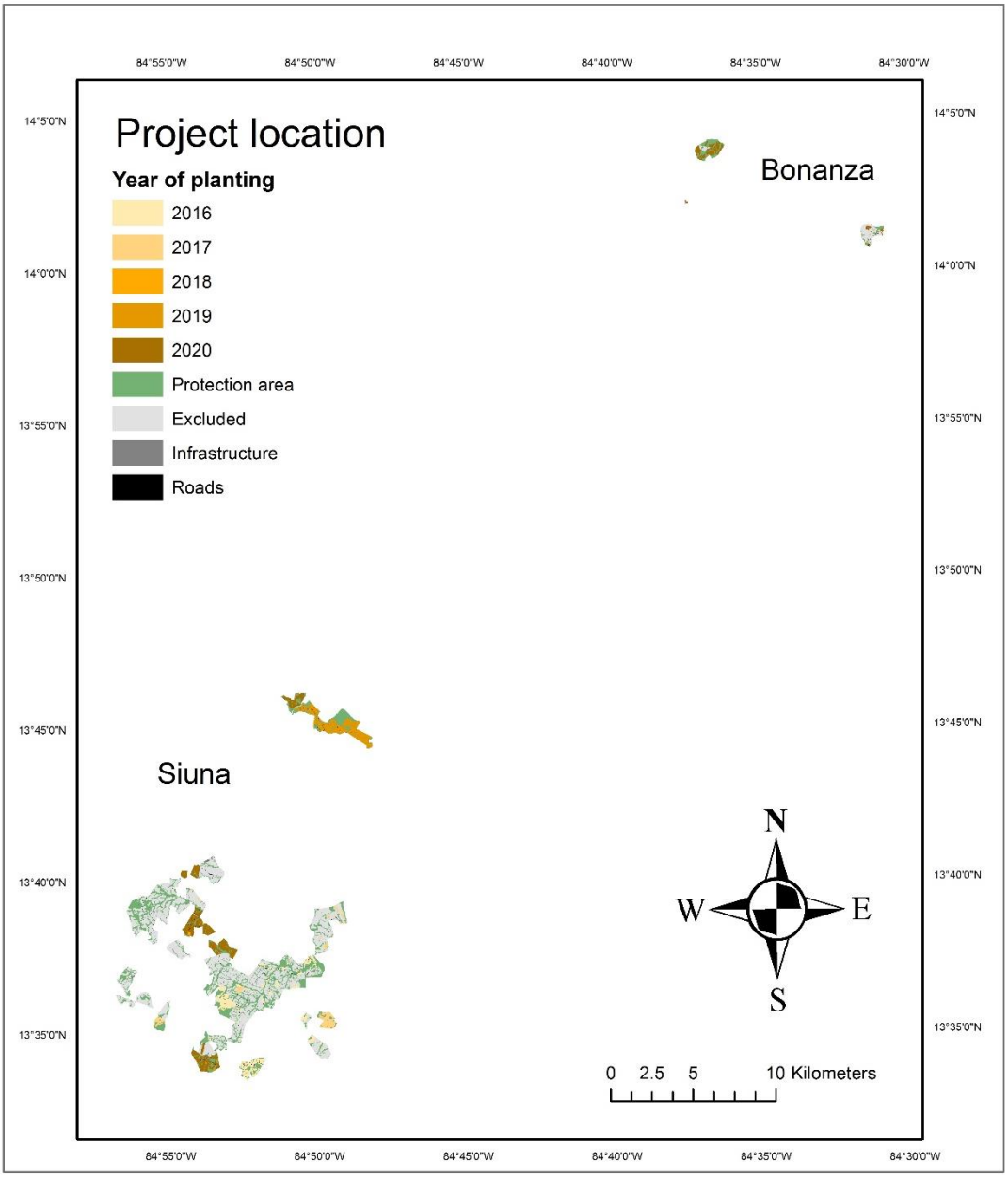


Figure 11 - Project location with indication of planting years, geographic boundaries and geodetic coordinates (see Figure 5 in section 1.12 for a map of the project location with indication of land cover).

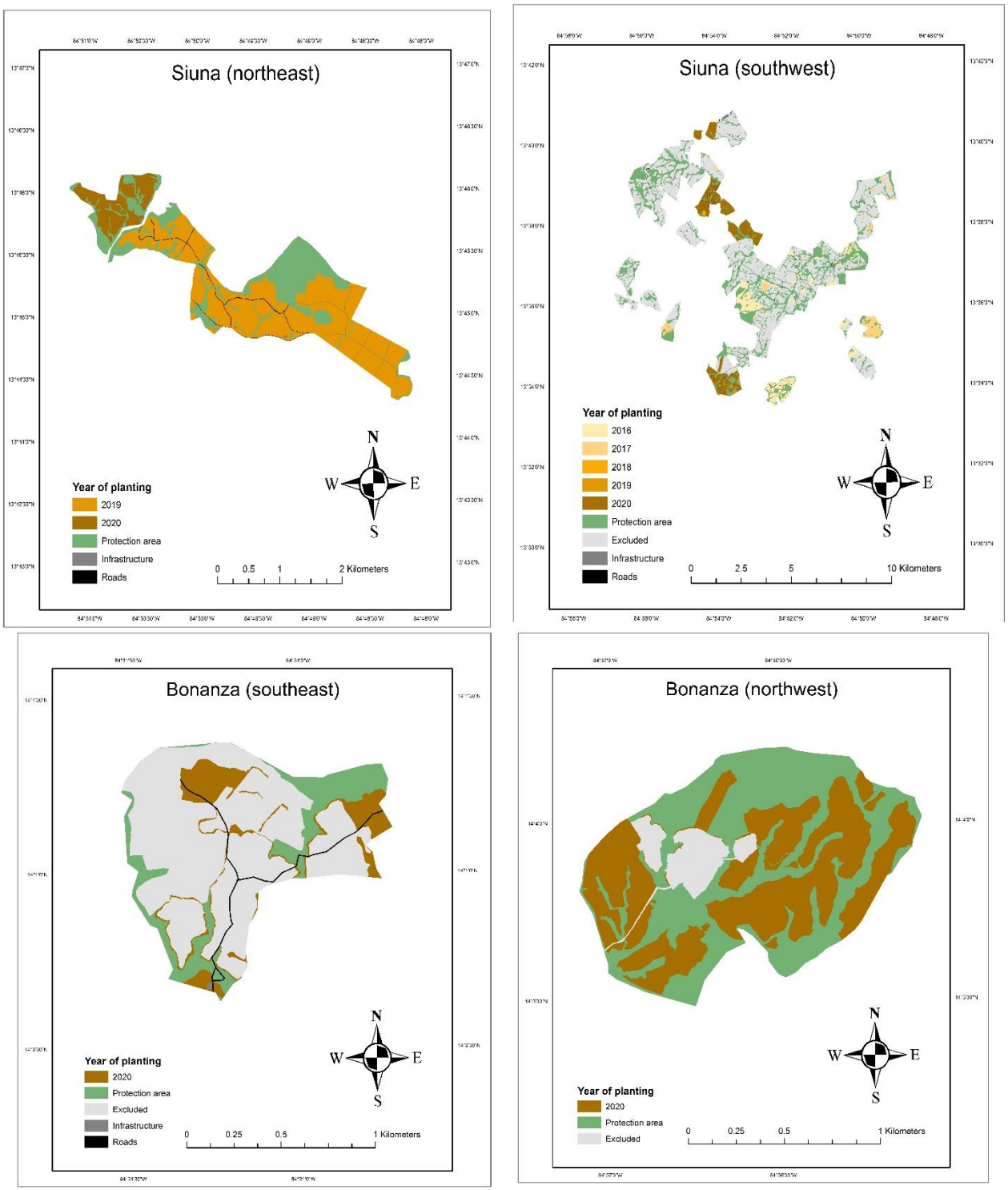


Figure 12 - Project boundaries of areas, with planting years

3.4 Baseline Scenario

The carbon stocks and change of carbon stocks of the various strata under the baseline scenario have been estimated as described in this chapter.

Four strata forming a mosaic landscape have been identified under the baseline scenario. These four strata were present under the baseline scenario in different compositions prior to the development of production areas or restoration of protection areas in the project.

Analyses on the Geographic Registries from MLR show that of productive land areas, approximately 71.6% were before intervention classified as pasture lands, and 28.4% as tacotales [30]. Furthermore, 6% of the project area has been planted with cocoa in an earlier stage.

The definition for tacotales used in the MLR analysis includes remnant forest. Remnant forest patches were conserved by MLR, and are now included in the protection areas. As a consequence, the baseline area distribution of the protection areas is different from the analysis mentioned above.

The study on Land use change by Chavarría [17] provides a land use ratio of 26,66% forest and 73,33% agricultural land for Siuna (Landsat images of 2005). The protection areas are considered to be a representation of the total area as described by this study, since it does not make a distinction between productive and unproductive lands.

The remaining 73,33% is composed of pasture lands and tacotales, for which 71,6% is classified as pasture lands and 28,4% as tacotales following the MLR analysis [30]. This is considered to be conservative as the MLR analysis included remnant forest in the tacotales.

This leads to the following stratification of the baseline strata (Table 2).

Table 2 Stratification of baseline strata in the project area

Baseline	Bonanza area (ha)	Siuna area (ha)	Total area (ha)	Percentage
Pasture	46,66	1367,68	1414,34	**55%**
Tacotales	18,51	578,93	597,44	**23%**
Remnant forest	23,69	364,66	388,35	**15%**
Cacao	73,08	101,18	174,26	**7%**
Total	161,94	2412,45	2574,39	**100%**

A further description of the baseline strata is given:

Stratum 1: pasture land

The majority of MLR's property were classified as pasture land. This land was in the pre-project stage used for low-productive, extensive cattle grazing. This type of pasture land is characterized by unmanaged grasslands, which are degrading because of grazing activities [11]. The lands sometimes have scattered trees remaining, generally of species protected by law (e.g. Caoba (*Swietenia macrophylla*) and Cedro *(Cedrela Odorata)*). No shrubs or significant shrub cover were present in this baseline land use type.

Stratum 2: "tacotales" or abandoned pasture land

The second most common baseline is abandoned pasture land where shrub and tree regrowth have taken place in recent years [24]. This land is classified locally as 'tacotales', and is defined as 'young vegetation, dense shrubs and/or secondary regrowth' [19]. There is an often dense shrub cover, some remaining trees, and presence of pioneer trees species such as balsa (*Ochroma Pyramidale).*

Stratum 3: remnant forest

The remnant forest present in MLR's areas are relatively limited, as the properties have undergone deforestation and land-use changes many decades ago [11], The areas with left-over forests are mostly located near small rivers. Such forests are often denominated as 'gallery' or 'riparian forests', and these can be considered affected primary forests or secondary forest patches. Often, these forest patches have also undergone human intervention for (illegal) timber logging or some cattle grazing in the past. Despite their limited size, these remnant forests have an important role in conserving biodiversity in the region [11]. Some tree species present in such remnant forests are Caoba (*Swietenia macrophylla*), Laurel (*Cordia alliodora*) and Cedro (*Cedrela Odorata*), of which some are protected by law.

Stratum 4: cacao with remnant indigenous trees

Part of the project areas was planted with cacao before the start of the project. This baseline land-use category is covered with productive cacao shrubs (*Theobroma cacao*) [11]. In some areas there is presence of scattered remaining trees (protected by law) (e.g. Caoba, Cedro) [24].

3.5 Additionality

Following the CDM methodology AR-ACM0003, the "Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities" is used to demonstrate the additionality of the proposed VCS project.

The tool has two Applicability Conditions, which are met:

- The proposed project activities do not lead to the violation of any applicable law, see section 1.14.
- The proposed project is not a small-scale project according to the UNFCCC definitions [31]. The expected GHG sequestration is more than 8 kilotons per year and the project is not a low-income community project.

Following the tool's section II.6, a few steps must be applied to demonstrate additionality:

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

The project was born in 2008 as reforestation initiative of the former owner [24]. Management of the property was done by Norteak Madera until mid 2015 [32]. Since then, the investment group opted for the direct operation of the project, forming a technical group, in charge of carrying out the development and operation of the project according to the vision from the owners.

From the acquisition of the company, MLR Forestal's management has aimed for a sustainable reforestation project combining high quality timber production and sustainable cacao production with carbon crediting for revenue generation. PP has set up the commercial agroforestry project as an example for sustainable plantation establishment and management, and contributing to the Caribbean Coast Development Strategy of the Atlantic North Autonomic Region. MLR implements the project according to the highest technical, social and environmental benchmarks available, notably by certifying the plantation to international FSC standards and its UTZ certification for cacao.

The registration and sale of carbon credits have always been an important part of the original plan of MLR's management, as set out in the document 'Initiative Forestal', section VIII 'ESTIMACIÓN DEL SECUESTRO DE CARBONO' [33], and were considered an important economic pillar for the financial sustainability of the project. Due to poor demand conditions of voluntary carbon markets [34], the cost involved in registration and sale of carbon credits would not be compensated by revenues. This would make a carbon project not additional and therefore this activity was initially not pursued by the management. With the recovering voluntary carbon market, registration and sale of CERs become additional again for MLR.

STEP 1. Identification of alternative land use scenarios to the proposed A/R CDM project activity

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

Land use scenario A: Continuation of the pre-project land use;

The vegetation cover of the North Atlantic Caribbean Coast Autonomous Region (RACCN) has shown a decrease of approximately 431,000 hectares in the period from 2001 to 2017 [24]. This region is responsible for 62% of the country loss of vegetation cover, and the municipalities of Rosita, Siuna and Bonanza, contributing to this forest loss with percentages of

38, 26 and 25 respectively [35]. According to a diagnostic presented by J. Guevara of Centro Humboldt, an environmental NGO, Nicaragua will be left without forest cover by 2028 with actual deforestation rates [36].

The Siuna and Bonanza project site is located within the buffer zone of the BOSAWAS biosphere reserve (RBB) [37]. The management plan in force for this reserve allows for cattle ranching activities in this zone, but clear definitions and control mechanisms that ensure sustainability and do not result in deforestation loss, are absent [37].

In this scenario, the project area continues to be deforested and would even further degrade. Areas with grasslands and shrubs and remaining forest patches will gradually be lost due to the continuous pressure for land for extensive and low-productive animal husbandry; this scenario is the easiest and cheapest way of taking advantage of the area, not only for the existing population in nearby communities, but also for migrants from other regions of the country. The purchase of animals for dairy and meat production, and their low maintenance cost makes this a very likely scenario, as is occurring in large parts of the project region.

This process of deforestation and forest degradation is often referred to as the advance of the agricultural frontier, the geographical boundary between forest ecosystems and agricultural land-use [37].

The common practice driving the advance of the agricultural frontier are land clearing cycles through fire or removal of vegetation through application of herbicides or by hand, adding to the lack of measures to protect soil erosion that leads to a loss of organic matter and exhaustion of the soil structure. This leads to a substantial loss of soil fertility, often resulting in abandoned degraded lands, extensive grazing and erosion due to trampling and lack of vegetation.

Overall, it is likely that deforested lands and remaining forest patches would be cleared again to turn it in pasture for subsistence animal husbandry farming. Therefore, the same effects as for the current grasslands can be expected with further degradation and erosion.

Land use scenario B: The area is turned into a traditional cacao plantation;

Historically, cacao has been an important crop in the country. This agricultural activity is promoted by the national government through programs such as the program ProCacao. The ProCacao programme assisted farmers with the use of grafted seedlings and improve productivity through the transfer of knowledge and better agricultural practices.

The cacao production systems can be either established in systems with and without forest cover. In the Siuna region cacao production is often an element of a range of production of (subsistence) crops, such as beans, maize and grassland for cattle. The sustainability of such cacao systems in terms of soil degradation, nutrient loss, species and biodiversity loss and environmental services is highly variable; often, cacao farms are poorly managed and do not reach optimal production levels [38].

In the Caribbean North, ten Cacao cooperatives are active; one of those is located in the Siuna municipality, namely Cooperativa Campesina Coopesiuna, of which 163 small producers are part. In 2018, the total area under production by the producers was 700 'manzanas', equal to 490 hectares [39]. At national level, 11,100 hectares of cacao are planted, of which 7,200 are productive [40].

This scenario generally expands in mosaics of land areas if the price of cacao is sufficiently high or when demand is considered stable/increasing. International price levels have been considerably lower compared to its peak in 2011 (approx. 36%) [41], but the Nicaraguan cacao is generally well-received on the international markets, and cacao is one of the few agric commodities that has found its way up in terms of volume and export value in the past years [42]. Overall, this scenario could be considered likely for (at least a part) of the project area. It must be noted that, in case sections of the land area would be used for cacao production, they would likely be abandoned because of unproductivity of crops after approximately 15 years.

Land use scenario C: Subsistence mining

The triangle Siuna-Rosita-Bonanza is an historic mining area. The first mining activities date back to 1890, but it was until the 1950's that economic mining activity took a boost. The road connecting these cities, was constructed in 1953 by transnational mining cooperation for the purpose of transporting mining equipment, staff and the shipping of mining products. Eight million ounces of gold have been produced in the mining triangle (Siuna-Rosita-Bonanza) up to date.

The artisanal mining is an important activity by the local population in the region, and known as 'güirisería'. Principle metals that can be found in this region are gold and silver. This mining activity is characterized by hand-work, use of simple tools and machinery realized by individuals or small local mining cooperation's, and by the application of mercury and cyanide for the extraction of gold [43]. This activity takes place in particular in water bodies, which currently fall within the protection areas of the project.

The mining activity can have a strong negative impact on the environment if not done correctly, due to large scale soil and water contamination (with mercury) with strong long-term effects on ecosystem and community health, as well as forest deforestation. The residual contaminated water streams often affect local population and animal husbandry, and is an historic source of social conflicts in the region [24]. Generally, used or abandoned mining sites are not apt for production of food crops, and remain contaminated and abandoned for decades.

Land use scenario D: Conventional commercial reforestation plantation without VCS certification.

The Forest Conservation, Promotion and Development Act No. 462 states that the state has "the responsibility to ensure the sustainable development of the forest sector" for the purpose of encouraging the development of the forest sector, promoting the elaboration of activities of

adequate management of forest resources and achieving the reversal of the deforestation process suffered by the country.

In September 2003, this law was approved with the purpose of establishing legal regime for conservation and sustainable development of the sector. The act ensured financial incentives for enterprises that invest in reforestation or the establishment of plantation. These financial incentives initially lead to the attraction of foreign investors in forestry plantation.

Overall, the impact of the Act has been limited: only 12 enterprises registered its Forestry Initiative between 2009 and 2017, possibly due to the extensive documentation that needs to be supplied. The Act in general is focused on larger, legally established enterprises, and does not foresee in support to small-scale landholders. Overall, registered forestry plantation enterprises have less than 20,000 ha under management, including MLR Forestry [44].

Investments in forest plantation (without CER sales) are generally seen as unattractive due to the long period of investment required and subsequent return periods for most investors (approximately 15-25 years), even despite financial tax incentives provided by the government. Investors or banks are usually not willing to invest such a large amount of time before cash-flow becomes positive. Usually, a good part of the timber (in particular pre-harvest thinnings) can be sold on domestic markets, but timber prices in the region are low, also caused by a high influx of illegal timber from illegal logging and deforestation, which is estimated at 55% in the BOSAWAS region [45].

Outcome of Sub-step 1a: *List of credible alternative land use scenarios that would have occurred on the land within the project boundary of the A/R CDM project activity.*

a) Land use scenario A: Continuation of the pre-project land use;
b) Land use scenario B: The area is turned into a traditional cacao plantation;
c) Land use scenario C: Subsistence mining
d) Land use scenario D: Conventional commercial reforestation plantation without VCS certification.

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

Land use scenario A: Continuation of the pre-project land use;
The BOSAWAS Management plan does not allow for unsustainable land-use practices in the buffer zone, and foresees only in cattle ranging in silvopastoral schemes, taking into account soil use capacity. However, law enforcement and governance in the region is very weak, and unsustainable land-use practices and land-use conversion for monetary gain is the norm in the region, evidenced by the deforestation statistics and high level of degraded lands. Hence, existing legislation is currently not sufficiently enforced to prevent encroachment of the remaining forest patches.

This land-use scenario is characterized by low-productive and extensive cattle grazing, which will lead to further degradation of soils and remaining forests.

Land use scenario B: The area is turned into a traditional cacao plantation;

Planting of cacao is in line with the BOSAWAS Management plan and is actually promoted by the government by its ProCacao programme. It is not in conflict with the any Nicaraguan legislation.

Land use scenario C: Subsistence mining

Subsistence mining, with the use of eco-friendly technologies, is allowed in the Bosawás buffer zone according to the BOSAWAS Management plan. According to Decree 20-2017, such activities require an environmental authorization for the exploitation and/or processing of small mining with a production level of up to 15 tons/day. [46].
The use of mercury is common, which does not comply with the requirement of eco-friendly technologies. Subsistence mining, however, is wide-spread in the region, and authorities are not properly enforcing this legislation due to the socio economic implications [45].

Land use scenario D: Conventional commercial reforestation plantation without VCS certification

Commercial plantation forestry is allowed within the BOSAWAS Management plan. Establishment of commercial plantations on degraded forest land is allowed and stimulated by the national and local governments. The Forest Conservation, Promotion and Development Act No. 462 actually provides incentives to do so. As such, this scenario is not in conflict with any Nicaraguan legislation.

Outcome substep 1b

All alternative land-use scenarios comply are plausible alternatives, either in compliance with laws or are generally present in the region due to the systemic lack of enforcement.

STEP 2. Barrier analysis

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

Land use scenario A: Continuation of the pre-project land use

This land use scenario is not constrained by any barriers and is therefore the prevailing land use practice.

Land use scenario B: The area is turned into a traditional cacao plantation;

Ecological barriers

The soils of the areas have been considerably exhausted due the deforestation and extensive cattle grazing [24]. Presence of cattle compact soils, which is the opposite soil condition of what cacao plants need to flourish [47]. Traditional cacao planting will therefore be of very limited productivity, unless considerable investment is done in improving soils and nutrient levels.

Poverty barrier

Nicaragua is a country with a high degree of poverty, particularly in rural areas. According to the 2009 Living Standards Measurement Survey (LSMS), 42.5% of the population lives in poverty, with 14.6% in a state of extreme poverty [48]. Average annual income has been calculated at US$ 1,870, with rural population at lower levels [49]. The population in the villages of the region generally depends on subsistence agriculture in small farms nearby their houses, which allows for survival and occasional side-selling, but not for making a step toward higher incomes.

The North Caribbean Coast Autonomous Region (RACCN), is populated by approximately 394,792 inhabitants (INIDE 2008), where 27% of the total population is located in urban areas, while 73% is located in rural areas. The Human Development Report (UNDP, 2019), the human development index for Nicaragua and the RACCN region is 0.651, which represents low human development conditions, including low income per capita [50].

Credit access barrier

It is recognized by the Nicaraguan Government in their reports that the fragility of the banking system is a problem to be solved in order to secure the economic development of the country [48]. Agrarian reform introduced new land titles of property, but these are rarely accepted as a guarantee by the commercial banks. No credit is available from credit institutions in this region. Additionally, the poor geographical location of financial institution nationwide, lack of use of bank accounts (and as such, registered income history), hinder issuing of productive loans. As such, farmers can often not access credit based on their houses, land titles, or farming activities, which will make it nearly impossible for them to acquire larger farms such as those in the project, for developing and investing in a cacao plantation.

Social barrier

Although cacao is increasing in importance as productive crop, and promoted by national government initiatives, overall production area at national and regional level is still very low, with only 7,200 ha of productive cacao areas nationwide, and taking place at small scale [47]. Absent of knowledge among the rural population, due to limited knowledge and knowledge transfer (by e.g. government, education institutes, NGOs), is a barrier for this scenario.

Intensive training must be done to the local communities to get to well-managed , as cacao cultivation is not a common and historic crop grown by the local communities, and management differs considerable from annual cash crops (e.g. the longer investment period, maintenance efforts required).

Disease barrier

The Frosty pod disease (FPD), a fungal disease caused by Moniliophthora roreri, strongly affects cacao production and can cause near-total crop failure [51]. The disease manifests itself in the form of brown spreading lesions on the pod surface and ultimately the production of powdery spores. The disease has reached plantations in Nicaragua and is even more difficult to control than the better known witches' broom disease, as the spores are often the first sign of infection. The disease mostly springs up in poorly managed plantations – MLR's well-managed cacao plantations are not suffering from the disease. It is estimated that production without the fungi is between 5 and 25 qq (quintales) per hectare in Nicaragua, while those affected by FPD reach 3.5 qq/ha [52].

Investment barrier

The 3-5 year period which cacao plants require to become productive often provides too little financial incentives for subsistence farmers. To provide annual income, they prefer land-use activities that provide food crops and returns in the same year.

Land use scenario C: Subsistence mining

Human health barrier

The artisanal mining is usually done by the application of mercury (among 98% of miners) [43], which utilization has grave consequences for the miners, their families and especially their children, who are often playing in the same river where mercury is applied. Persons coming in contact with (water-contaminated) mercury, or relying on drinking water contaminated with mercury, suffer from impact of mercury on the nervous system, brains, lungs and kidneys. Worst cases suffer from muscle tremors, and deterioration of the motoric system [43]. Many families who were dedicated to subsistence mining in the past have left this activity for health reasons.

Ecological barrier

Similar to the effects on human health, the use of mercury leads to contaminated soils and water, affecting the aquatic and terrestrial flora and fauna and having a strong impact on the local biodiversity.

Over-exploitation barrier

Many of the mines in the Siuna-Rosita-Bonanza triangle have already ran through numerous phases of exploration, and much of the 'low hanging fruit' has already been exploited during past mining booms. Mining sites are generally characterized by their spontaneous and temporal nature.

Due to over-exploitation, the mineral extracted by artisanal miners tends to have low grades, forcing artisanal miners to search for ore in deeper and riskier areas without obtaining the expected economic return, which makes this activity riskier and less profitable.

Labor security barrier

One of the largest barrier of gold mining is the high labor insecurity it implies. As finding small pieces of gold or silver is a strong matter of luck, days of heavy labor do not form any guarantee for an income, let alone a stable and reliable income [43]. Often, months pass in which income is not covering costs for subsistence miners. As such, many families prefer dedicating their labor time towards more secure forms of income (e.g. cattle raising) [24] that also provide more food security.

Land use scenario D: Conventional commercial reforestation plantation without VCS certification

Investment barrier

The project's region is a remote area of Nicaragua, where conflicts with respect to land-tenure, encroachment of areas due to illegal mining/deforestation does not stimulate foreign investment. Capital investment does not easily find its way in this region of the country, and is perceived as high risk (in an already risky country, as can be observed by the countries risk premium of 9,5% [53]). Also, banks demand high interest rates [54]. Investment for sustainable and commercial reforestation is therefore often tied to foreign investors, demanding high returns, extensive risk mitigation strategies and clear ecological and social co-benefits, including demonstrated positive contributions to climate change mitigation. These demands are difficult to bring together and efforts to mitigate risks and enhance co-benefits raise costs compared with conventional plantation development. This tension in the business model can be eased with the use of carbon finance. Without carbon finance, many of the additional goals that PP has set to ensure sustainability of the project, could not be achieved.

Institutional barrier

The insecure and often disputed land-tenure titles do not favor investment in commercial reforestation, as the only option is to realize this on private land. As in many developing countries, the judicial system is relatively weak, and corruption levels are considerable (Nicaragua ranking at place 161 of 180 at Transparency international's Corruption Perception Index), which is debilitating the appetite for private investment.

Informality barrier

A lot of illegal logging is taking place in the BOSAWAS buffer zone region, leading to informal timber market places with low prices [45]. This does not favor the establishment of a commercial reforestation plantation, as competition of informal markets is fierce.

Distance to ports barrier

The distance of the Siuna and Bonanza region to shipping ports is relatively high. Both the Atlantic and Pacific ports the truck transport time is above 10 hours, with bad road conditions

and a river-pass by boat (Atlantic port) complicating transport. This transport time is relatively long for the Central-American region.

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

The following table shows the summary of barriers hindering land-use option scenarios

Land use scenario	Barriers limiting scenario
A - Continuation of the pre-project land use	-
B - The area is turned into a traditional cacao plantation	Ecological barrier Poverty barrier Credit access barrier Social barrier Disease barrier Investment barrier
C - Subsistence mining	Human health barrier Ecological barrier Over-exploitation barrier Labor security barrier
D - Conventional commercial reforestation plantation without VCS certification	Human health barrier Ecological barrier Over-exploitation barrier Labor security barrier

Outcome of step 2b.

Considering the barriers present for land use scenario B, C and D, these will be excluded from further consideration.

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

Land-use scenario A is the only scenario left in sub-step 2b:

This land-use scenario is continuation of the pre-project land use, which is low-productive and extensive cattle grazing, which leads to further degradation of soils and remaining forests.

This is the baseline scenario.

STEP 4. Common practice analysis

In Nicaragua, commercial reforestation has large potential, but is still a relatively small sector that is not expanding. Its economic potential is not exploited. Teak is considered among the eight ideal species for the establishment of industrial plantations in Nicaragua, with a potential area of more than 1,7 million hectares [55].

Reports indicate that a mere 27,000 ha of commercial plantations where established between 2003 and 2018 in Nicaragua [56]. MLR's plantations is the only reforestation company present in the SIUNA (RACCN) region, and the only enterprise that is combining this innovatively under a mixed teak-cacao agroforestry scheme in the nation. It is mentioned that the reforestation sector passes through a strong reduction in investment and hectares established, with only 450 ha of newly established plantations at national level, a part of that being realized by MLR [56].

In the difficult economic environment that Nicaragua is, MLR's approach can be called unique due to its product diversification, FSC and UTZ certification.

Concluding from step 4: Common practice analysis of section it is proven that reforestation is not a common practice in the project zone. It is clear that the expected and most probable scenario is the continuity of pre-project activities (extensive cattle grazing on degraded lands, in and further degradation of forest areas).

As such, no long-term activities are observed to be similar to the proposed by the project, with the objective of reforestation. We can therefore establish that activities proposed by the A/R project for carbon sequestration proves to be additional.

3.6 Methodology Deviations

Not applicable.

4 ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Will be included in final report

4.2 Project Emissions

Will be included in final report

4.3 Leakage

Will be included in final report

4.4 Estimated Net GHG Emission Reductions and Removals

Will be included in final report

5 MONITORING

5.1 Data and Parameters Available at Validation

Will be included in final report

5.2 Data and Parameters Monitored

Will be included in final report

5.3 Monitoring Plan

Will be included in final report

6 ACHIEVED GHG EMISSION REDUCTIONS AND REMOVALS

6.1 Data and Parameters Monitored

Will be included in final report

6.2 Baseline Emissions

Will be included in final report

6.3 Project Emissions

Will be included in final report

6.4 Leakage

Will be included in final report

6.5 Net GHG Emission Reductions and Removals

Will be included in final report

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APPENDIX I: CALCULATION FILE

Will be added as appendix to the final report.