



Plan Vivo Project Design Document (PDD) Limay Community Carbon Project



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SECTION A. General project description

A.1. Title and location of project

Limay Community Carbon Project, municipality of San Juan de Limay, Esteli, Nicaragua.

A.2. Description of project aims and activities

The overall aim of the project is to improve the livelihoods of sustenance farmers in the Platanares watershed, by developing sustainable land-use management strategies that increase carbon sinks.

The project has the following aims:

- Increase and diversify small scale farmers' income
- Improve small scale farmers' quality of life
- Increase the supply of locally and sustainably produced wood products
- Reduce future forest degradation by addressing drivers of forest degradation and deforestation
- Increase forest cover and water retention within the municipality

These aims will be achieved through the following activities:

- The establishment of forest plantations (carbon crediting activity)
 - Sustainable source of firewood and timber
 - Viable source of medium and long term revenues
- Land use planning around critical watersheds (supporting activity)
 - The project boundary consists of one of the most critical watersheds in the municipality of San Juan de Limay, which suffers from seasonal water shortages and flooding. The majority of the community's water comes from this area so increased forest cover will help retain water through the dry season and minimize flooding in the rainy season.
- The construction and distribution of fuel-efficient fireplaces (supporting activity)
 - Unlike traditional ones, these are equipped with chimneys that reduce the amount of smoke within the household, which can have large health benefits on the women who traditionally spent a significant portion of the day in the kitchen.
 - Due to efficiency, this reduces some of the pressure on future forest degradation and the amount of time needed to gather wood.

A.3. Project participants

The project participants in the Limay Community Carbon Project are multiple small landholders located in the Platanares watershed, which covers an area of 74 km². Participants must own economically underutilized land that is in need of reforestation, be located within proximity to road access, and must demonstrate that participating in the project will not conflict with their subsistence activities, notable cattle ranching and agriculture.

Nicaragua is the second poorest country in the Western Hemisphere with a GDP per capita income of \$1,079¹ of a national level. Although reliable income statistics for the Platanares watershed are unavailable, San Juan de Limay is known to be amongst the poorer regions of Nicaragua. However, despite low-income levels, there is an average of 32 hectares per inhabitant in the area.

A.4. Description of location and boundaries of the project

Project activities will take place on multiple small scale landholdings located within the Platanares watershed, which is used as the project boundary. It is located in the municipality of San Juan de Limay within the department of Esteli, Nicaragua. The exact location and UTM coordinates are shown below in figures 1 and 2.

¹ CIA world fact-book, Nicaragua: <https://www.cia.gov/library/publications/the-world-factbook/geos/nu.html>

Figure 1 – Location of San Juan de Limay with Nicaragua

Nicaragua

Department of Esteli

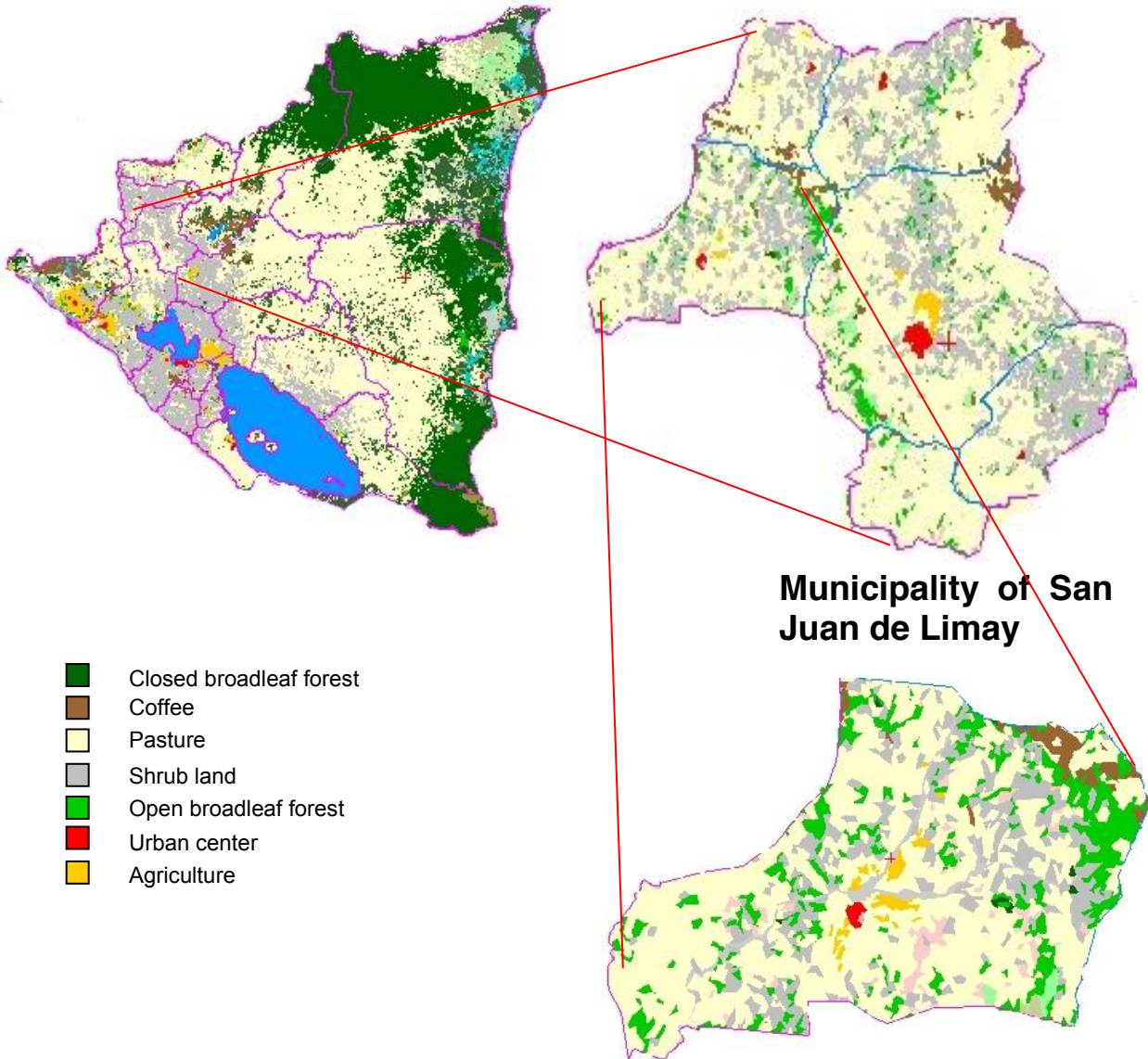
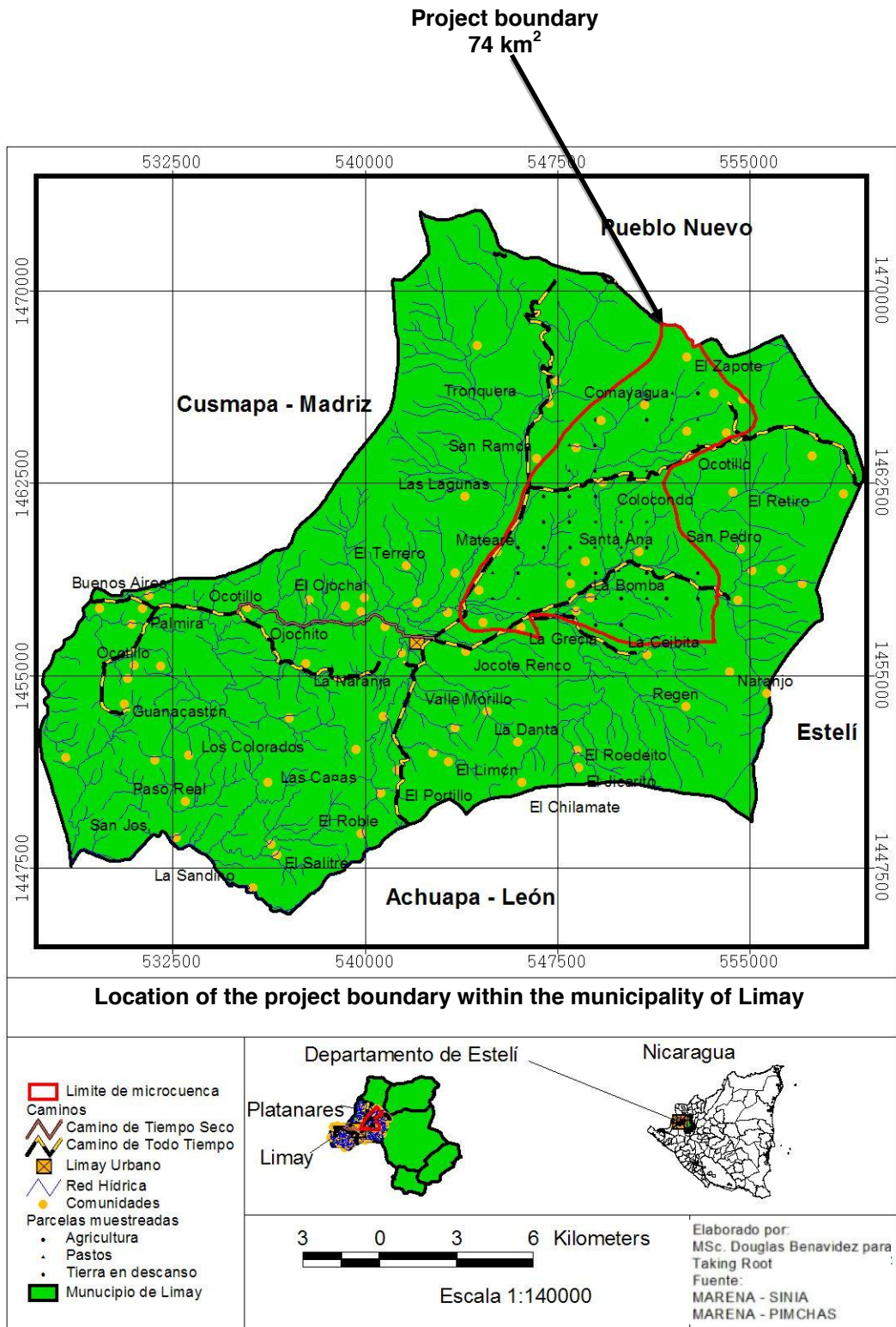


Figure 2 – Project boundary within the Municipality of San Juan de Limay



A.5. Description of the project objectives and target groups

The overall aim of the project is to increase the forest cover of the Platanares watershed while increasing the quality of life of its residents through an improvement in land use management and the sustainable use of forest resources.

Background

Through a process of community consultations and meetings with local governments and experts, the project has been received very positively (see annex 9 &10 for details of community visits) and numerous people present express a desire to participate. Additionally, the Platanares watershed was identified as the most environmentally critical area within the municipality. The majority of Limay's scarce water resources come from that specific watershed so an increase in forest cover in that area would have strategic benefits for the entire municipality. This will increase water retention during the rainy season and reduce flooding from the heavy rains in the wet season. Furthermore, this watershed is also the birthplace of the river Los Quesos, which merges with the Rio Negro, which dumps into the Estero Real, the biggest estuary on Nicaragua's Pacific coast. This estuary is an important habitat for numerous species, notably for migratory birds, shrimp and mangroves.

Due to the ecological importance of the watershed, the project has been welcomed by numerous government agencies, notably the Ministry of the Environment's department of climate change (Nicaragua's Designated Operational Entity) and the municipal government of San Juan de Limay.

Primary objectives of the project

- Improve the socio-economic conditions of the families located within the project boundary through alternative income sources generated from:
 - Payments for ecosystem services (PES)
 - Revenue from the sale of sustainable produced forest products
- Increase the efficiency of land-use planning and resources
- Restore degraded landscapes through native species reforestation
- Sequester quantifiable volumes of CO₂ from the atmosphere
- Increase water security within the municipality

A.6. Description of the project area

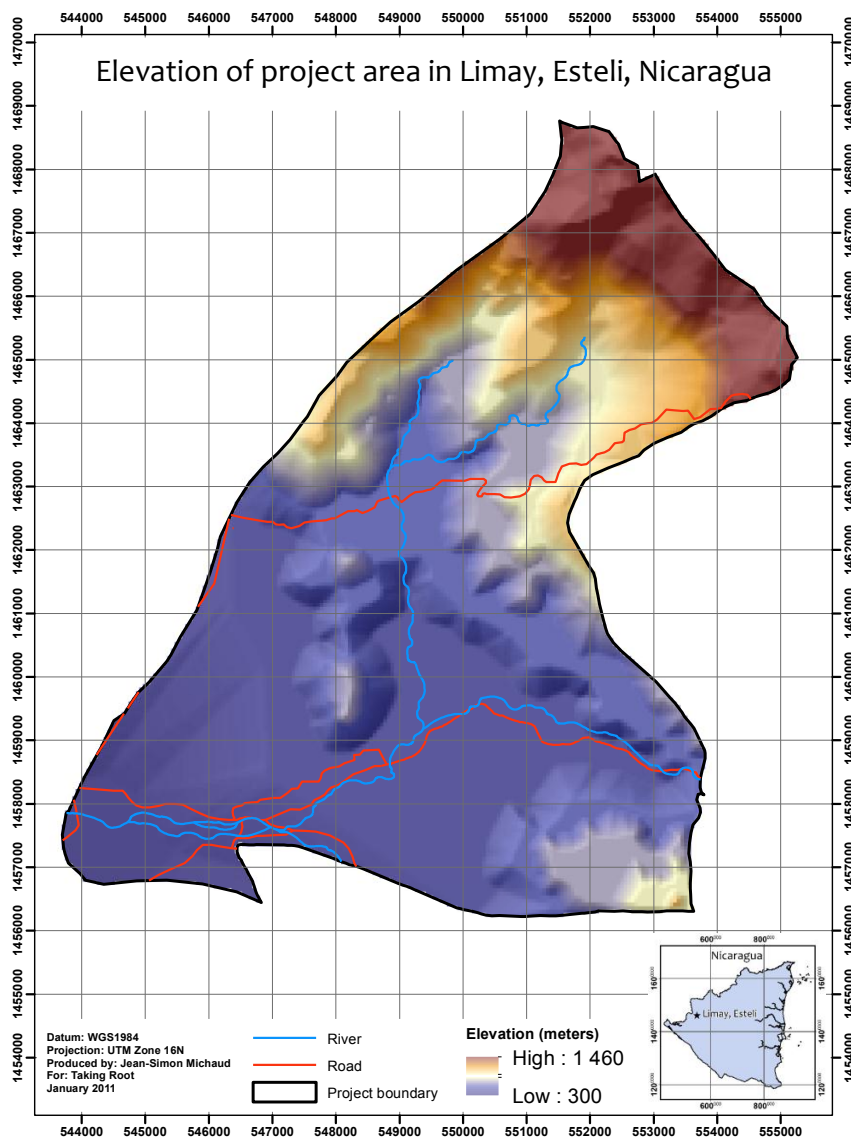
Climate Conditions

The region is characteristically hot with temperatures ranging between 24-34 °C with two distinct seasons, wet and dry. The rainy season begins in May and ends in October. Annual precipitation within the project boundary varies between 800 and 1,200 mm per year, almost all of which falls within the wet season.

Geography

90% of the territory of San Juan de Limay is mountainous with elevation ranging between 281 to 1352 meters from sea level with two significant mountains (Las Mesas del Orno, 1 352 meters and Loma El Zapote, 1 321 meters). The principal city, San Juan de Limay is located in a large valley of 6,100 hectares. Below is a topographic map of the area:

Figure 3 - Elevation within the Platanares watershed project area



Land use and land cover

During the “Green Revolution,” which began in the 1950s, vast areas of tropical dry forest in Nicaragua were cleared for large-scale cotton production. By 1980, cotton was Nicaragua’s second biggest export earner. By the end of the 1980s, production dropped drastically as a result of a drop in world cotton prices and the serious environmental damage caused by the

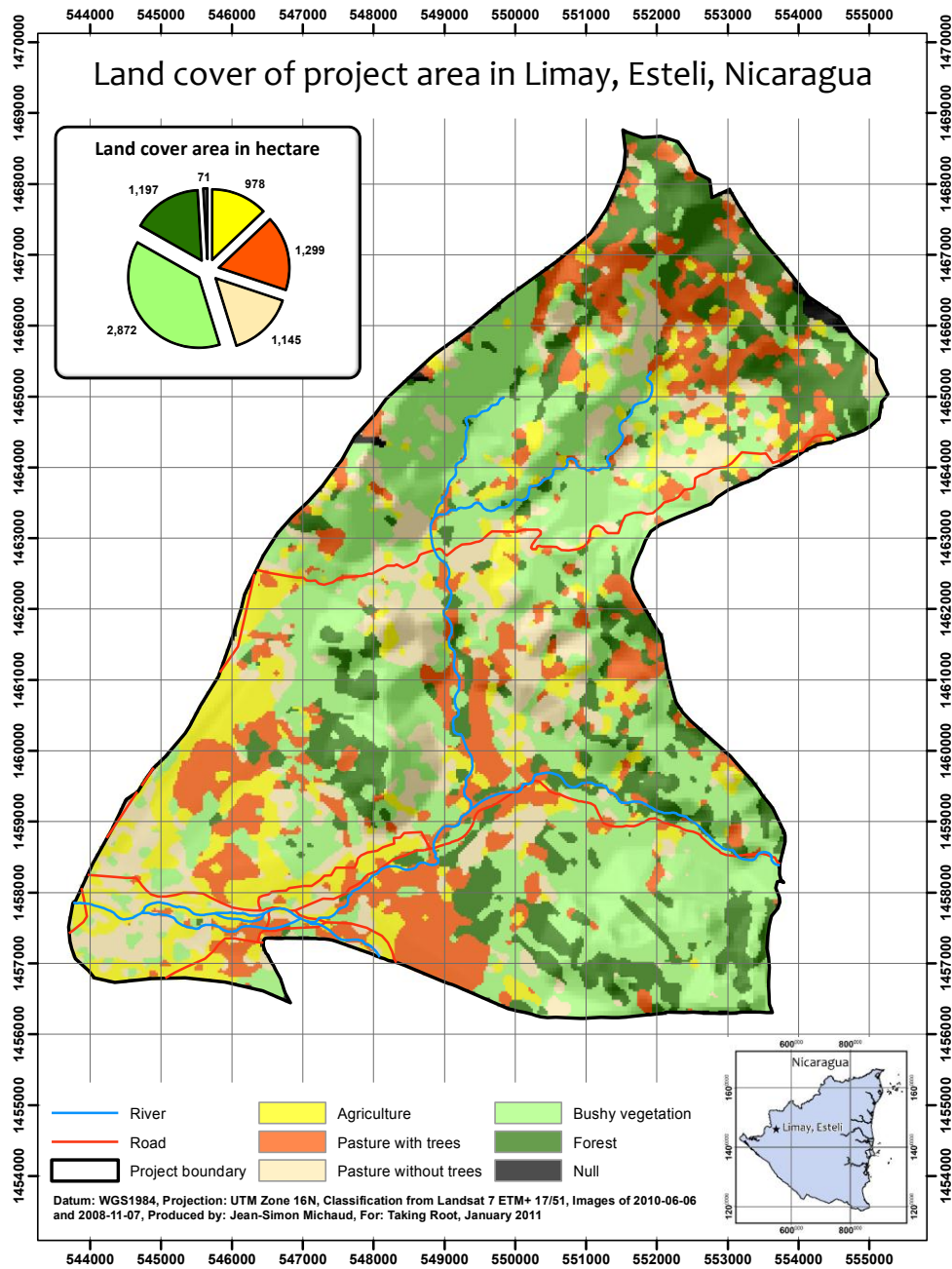
heavy erosion and the damage caused by the excessive use of pesticides². According to elders in San Juan de Limay, this process drastically changed the landscape and ecology of the region. Prior to the 1950s the area was blanketed in forest with abundant precipitation and wildlife. Over the span of one lifetime, the area was almost entirely deforested and converted into a seasonal desert (for greater details, see appendix 10). Presently, a few patches of secondary forest remain at low elevation and the steeper summits of the taller mountains still have some pine forests. A few scattered remnants of the giant trees that used to be omnipresent in the region remain throughout the valley. The most common mature large trees are *Enterolobium cyclocarpum*, *Ceiba pentandra* and *Albizia saman*. These are however extremely fast growing trees that are not particularly valuable timbers. Although not entirely extinct from the area, Pacific mahogany (*Swietenia humilis*) and spiny cedar (*bombacopsis quinata*) were once abundant.

Despite the occasional presence of endangered wildlife within the project boundary, there are currently no protected areas. Throughout the entire municipality of San Juan de Limay, approximately 3,140 hectares are dedicated to agriculture, which represents just over 7% of the territory. The main crops are sorghum, corn, and beans but the average yields are usually low and are therefore predominantly used for subsistence. In the regions with higher elevations, coffee is cultivated. The predominant land-use in the area is cattle grazing. However, due to the prolonged dry season, it takes a large amount of land to support cattle. It is estimated that it takes 1.4 hectares to support one cow. A common land use strategy in the region is to grow grain for a couple of years then convert the area to pasture. Once the area becomes too degraded to support pasture, it is abandoned for several years. After being abandoned for several years, it is eventually cleared for agriculture again.

² Federal Research Division of the Library of Congress. (1993). Nicaragua Country Studies Series. <http://countrystudies.us/nicaragua/38.htm>

Within the project boundary, the land cover was as follows:

Figure 4 – Vegetation cover within Platanares watershed project area



A.7. Description of socio-economic context and land tenure

The following socio-economic information is available for the entire Municipality of San Juan de Limay:

Population

Urban inhabitants: 3,668

Rural inhabitants: 9,787

Total inhabitants: 13,455

Population density: 31.5/km²

Indigenous population: 5,519

Figure 5 – Indigenous populations

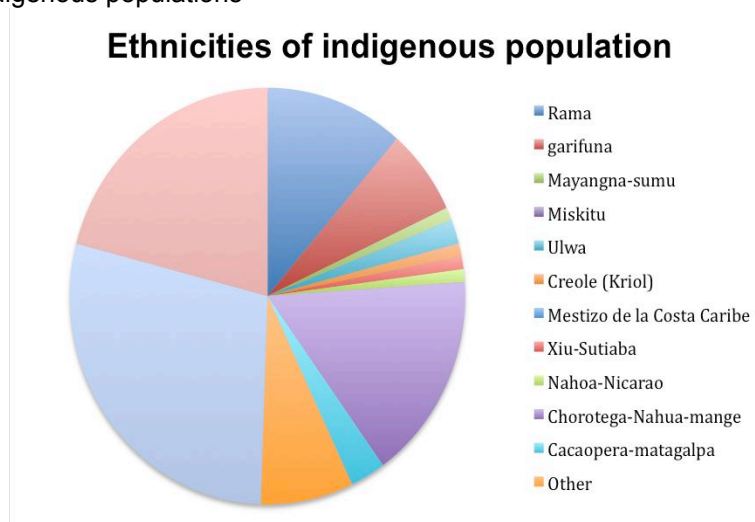
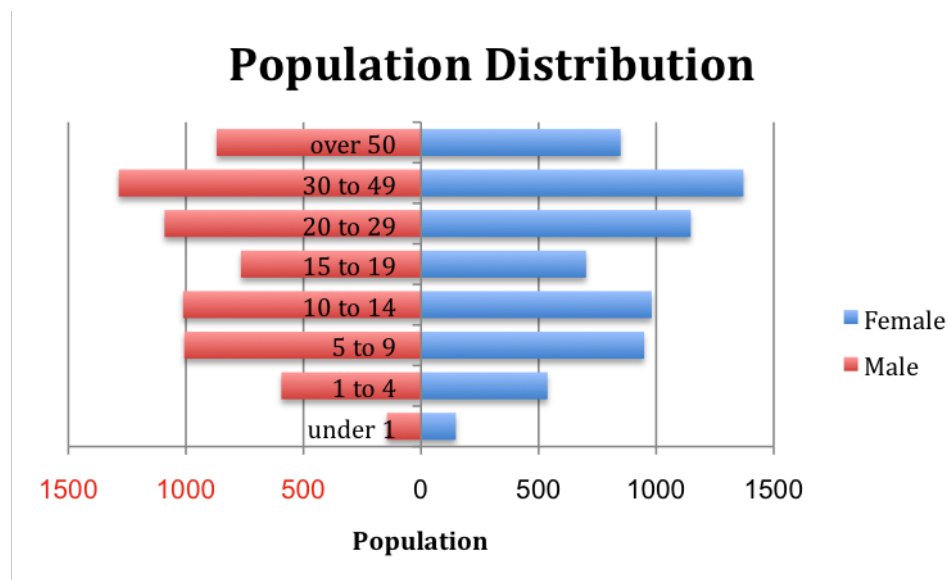


Figure 6 – Population distribution



Predominant religions: Catholic and evangelical

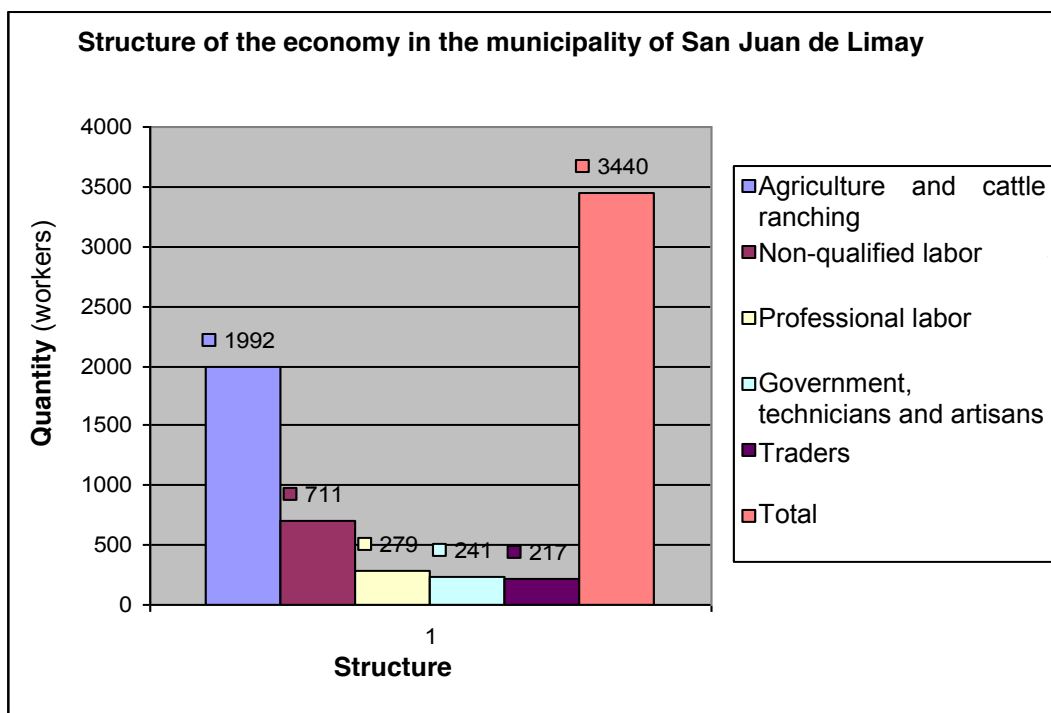
Firewood use

Within the entire municipality, 95.5% of the population uses wood for cooking. Outside of the urban centre, this percentage increases to 99.2%. The collection of this firewood is a

continuous pressure on surrounding forest resources, as next to none of it is sustainably produced. Regionally, and on a national level, forests are becoming increasingly scarce making it increasingly difficult to gather sufficient firewood. As a result, a cubic meter of firewood in larger urban centers outside of Limay is now sold for USD \$39.00. Consequently, more and more people from Limay have started transporting and selling their wood in bigger cities such as Somoto and Esteli, the neighbouring capitals³.

A second consequence of burning so much wood within the household is the negative effects it has on people's vision and respiratory tracks caused by excessive smoke inhalation.

Figure 7 – Structure of local economy



58% of people earn their sustenance directly from farming beans, corn, sorghum dairy and cattle (this is the project's target group).

21% of the work force work as unqualified labour, generally working on other people's farms or doing general construction,

8% of the work force work as professionals in offices or technicians,

7% work for the government, as officers or artisans, predominantly carving soapstone.

The remaining 6% are traders, generally buying and selling farmers agricultural surplus.

Agriculture is directly (production) and indirectly (trade and processing) the predominant form of livelihood in the region. However, agriculture commonly takes place without regard to zoning or the optimal potential of the area. Most farming in the region is done purely as a form of subsistence rather than a business and is overall not very productive. This is largely due to the poorly distributed rainfall in the region and the lack of access to financing despite farmers generally owning relatively large properties with fertile soils.

³ Benavidez, L. Douglas (2009). "Viabilidad Economica de la Actividad Forestal en Somoto." Unpublished.

One of the principal factors contributing to food insecurity in the region is attributed to excessive deforestation and poor management of the available resources, which has adversely affected people's economic opportunities.

Socio-economic baseline

The area of impacts considered for the socio-economic baseline include the following:

Table A.7.1

Area of impact	Items of measurement
Local incomes	<ul style="list-style-type: none"> • Percentage of households that have electricity • Percentage of households that own their house • Percentage of households that own land <ul style="list-style-type: none"> ○ Less than 2 manzanas (1 manzana = 0.744 hectares) ○ Between 2 and 5 manzanas ○ Between 6 and 10 manzanas ○ Between 11 and 50 manzanas ○ More than 50 manzanas • Illiteracy rate
Local food production	<ul style="list-style-type: none"> • Percentage of households that have improved pasture • Percentage of households that use irrigation
Landless families	<ul style="list-style-type: none"> • Percentage of landless households
Women	<ul style="list-style-type: none"> • Percentage of households with fuel-efficient cook stoves • Percentage of women who own their own house • Percentage of women who own cattle

These methods of measurement were used for the following reasons:

- Percentage of households that own their house:
With a higher income, it becomes possible for those families to build their own house and stop renting or squatting, and it can positively affect their living conditions.
- Percentage of households that own land:
With a higher income, it becomes possible for those families to buy more land and expand their farming, cattle or forestry activities.
- Illiteracy rate:
With a higher income, parents can afford to keep their children in school and give them access to higher education. Adults can also decide to go back to school to learn to read and write in order to better manage their business.
- Percentage of households that have improved pasture:
With the support of Taking Root, participating families will be taught how to manage more sustainably their pastures.
- Percentage of households that use irrigation:
With a higher income, families can decide to invest in different irrigation systems that can increase their land's yield and local food production.
- Percentage of landless households:
With a higher income and a healthier business, participating families can create jobs by hiring members of their communities. Eventually, those employees can save money and become landowners themselves.
- Percentage of households with fuel-efficient stove:
With the support of Taking Root, a fuel-efficient stove will be built in each participant's house.

- Percentage of women who own their own house:
Taking Root wants to evaluate their projects' impacts on women's lives. Will Taking Root's projects increase women's income and make it possible for them to buy land? Will Taking Root's projects have an impact on the sharing of land ownership between men and women?
- Percentage of women who own cattle:
Taking Root wants to evaluate the project's impacts on women's lives. Will Taking Root's projects increase women's income and make it possible for them to buy cattle?

Results of socioeconomic assessment for the baseline

The information was gathered through a process of interviews led by the municipality of Limay in August 2009. In total, 391 interviews were done in the 14 following communities: Aguas Calientes, Comayagua, El Pedernal, Graneros, La Grecia, Las Brisas, La Fraternidad, Mateares, Plantanares 1, Platanares 2, San Antonio, Santa Ana, Santa Cruz and Santa Pancha.

Table A.7.2

Areas of impact	Items of measurement	Results
Local incomes		
	Percentage of households that own their house	93%
	Percentage of households that own land	80%
	Less than 2 manzanas	20%
	Between 2 and 5 manzanas	37%
	Between 6 and 10 manzanas	8%
	Between 11 and 50 manzanas	15%
	More than 50 manzanas	1%
	Illiteracy rate	30%
Local food production		
	Percentage of households that have improved pasture	5%
	Percentage of households that use irrigation	9%
Landless families		
	Percentage of landless households	20%
Women		
	Percentage of households with fuel-efficient cook stoves	23%
	Percentage of women who own their own house	41%
	Percentage of women who own cattle	46%

A.8. Description of the Plan Vivo technical specifications (methodologies):

The project currently has one technical specification, for mixed species forest plantations, summarized in table A.8.

Title	Type of activity	Objectives	Brief description	Target areas/groups
Mixed Species forest Plantation	Reforestation	Improve soil fertility, water retention, provide a sustainable produced source of firewood and timber, diversify and improve producers' income.	This system involves the planting and intensive management of mixed native species and multi-purpose forest plantations. The plantations consist of alternating rows of firewood species produced for biomass and longer-lived hardwood species. The firewood species are both nitrogen fixing species and will be coppiced at an early age, providing an early harvest of merchantable firewood and fodder while fertilizing the soil. Due to the spacing between rows, there will be enough room for the shoots to grow back for a second harvest before being entirely crowded out by the hardwood species. The hardwood species are of variable growth rates and shape allowing complimentary thinnings before the entire stand reaches maturity.	Producers with a minimum of 8 hectares of privately owned, undisputed land claims (to insure food security) with underutilized portions in need of reforestation. Farm must have road access, be located below 600 masl.

A.9. Description of land tenure in relation to the rights to provide carbon services

Private landownership in Nicaragua

Prior to the Sandanista Revolution in 1979, the Somoza dictatorship and his allies owned the majority of the property in Nicaragua while the majority of the population was landless. After the revolution, the Sandanista government undertook massive agrarian reform within the country, which consisted of confiscating the properties of large landholders and redistributing it to the peasants in the form of cooperatives. Over time, the cooperatives dissolved and the land was divided amongst its members, generally informally. Consequently, very few legal land titles exist in many rural areas of the country, which has been a major impediment to development. As a result, the Nicaraguan government, in cooperation with the World Bank and the Nordic Development Fund, launched PRODEP, a programme designed to legalize land ownership. One of the priority areas has been the entire department of Esteli and the programme has been underway for several years in San Juan de Limay. As a result, a massive mapping exercise has been carried out in the entire region, which has greatly facilitated Taking Root's work.

San Juan de Limay

Individuals privately own the majority of the land in San Juan de Limay and there is an average of 32 hectares of land for every inhabitant. Only 3.09% of the area belongs to corporations and 0.04% belongs to family cooperatives. 20% of families do not own any land but this figure includes urban inhabitants.

For smallholders to enter into long-term carbon contracts with the project, and to avoid land tenure disputes, project participants must demonstrate their land tenure right in one of the following three ways:

- 1) Have a legal deed to their land
- 2) Their parents have a legal deed to the land and they have a legal contract with their parents demonstrating their legal right to a specified fraction of the property.
- 3) If the first two options are unavailable, an official letter from the local government testifying that they are the true owners of the land.

The sale of land title in the region is generally quite low. Land ownership is generally passed on from parents to children. However, in the case that a property is sold with a current Plan Vivo agreement, the contract will be passed along to the new owner.

10. Project organisational structure, governance and community participation:

Figure 8

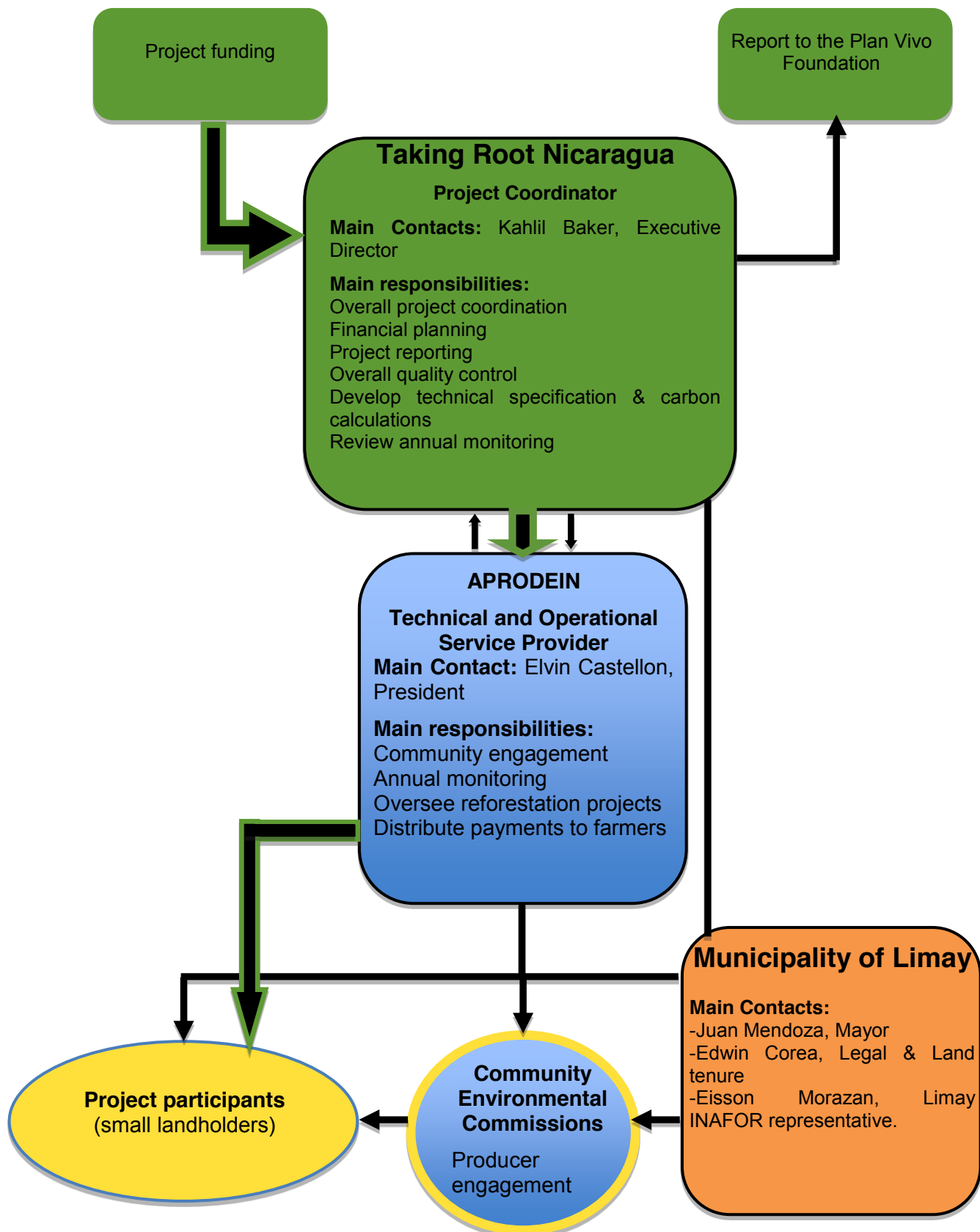


Table A10.

Key Function	Organisation/ group(s) involved	Type of group/ organisation and legal status	Brief description of activities
Project Coordination+ administration	Taking Root Nicaragua	Canadian federally incorporated, independent not for profit organization with operations in Nicaragua and Canada.	<ul style="list-style-type: none"> a. Overseeing project implementation and development. b. Negotiating and recording carbon sales with buyers c. Managing Plan Vivo fund including yearly payments to APRODEIN based on internal annual monitoring. d. Processing and recording Plan Vivos, producer sale agreements and other producer information. e. Storing reports and documentation. f. Coordinating external reviews g. Reporting to the Plan Vivo Foundation h. Assessing the security of land tenure rights. i. Receiving reports from APRODEIN j. Interfacing with local governments and APRODEIN.
Project Coordination	APRODEIN	Independent, not for profit Nicaraguan association	<ul style="list-style-type: none"> a. Administering yearly payments to producers b. Arrange community meetings for participants to discuss issues associated with the project and advise Taking Root on how to address issues. c. Improve local organizational capacity. d. Conducting workshops with participating producers
Project Technical Operations	Taking Root Nicaragua	As above	<ul style="list-style-type: none"> a. Developing technical specifications b. Developing carbon modelling. c. Review internal annual monitoring
Project Technical Operations	APRODEIN	As above	<ul style="list-style-type: none"> a. Assisting in all technical aspects of project development b. Providing technical support and training for producers Assisting in community training workshops. c. Assisting in the identification of relevant professionals and resources when needed. d. Collecting other data when required e. Carrying out internal annual monitoring
Community Engagement/ Participation	Taking Root Nicaragua	Canadian federally incorporated, independent not for profit organization with operations in Nicaragua and Canada.	<ul style="list-style-type: none"> a. Meet with individuals within target communities and community groups to discuss issues associated with the project and its operations.

A.11. Relationship to national organisations

Taking Root Nicaragua and its projects are privately funded and executed in partnership with individual farming families and therefore do not require the approval of any government authorities. However, the objective of the project is to work within the needs of the community and the various stakeholders involved.

This project falls within the government of Limay's long-term sustainable development objectives and is therefore fully supported by the Mayor's administration (see appendix 8, letter of support).

Although no government approval is required for planting trees, all harvesting and sustainable management of forest resources require approval by INAFOR's local office. Therefore, after planting, all reforestation projects and their management plans will be registered with the local INAFOR representative, who is regularly involved with the project. This process legally pre-approves the utilization of the forest plantations.

A.12. Technology transfer and training

Through a process of community and expert consultations, the majority of the project components were developed and designed by stakeholders (for an example, see appendix #11). Most community training sessions were designed using the "campesino a campesino" (farmer to farmer) method, facilitated by Elvin Castellon from APRODEIN. The "campesino a campesino" philosophy is based on utilizing the collective knowledge and experience of the different members of the community and sharing it amongst peers so that individuals may learn from each other. This philosophy values and promotes local knowledge and will continue being the basis of this project.

Mapping and project boundary selection

Critical watershed identification and selection was done in an expert consultation with municipal technicians and government officials of San Juan de Limay, APRODEIN and Taking Root (see appendix #9). Using existing information and the chosen watershed, the MARENA representative of Madriz, Douglas Benavidez, developed a series of maps using ArcView. Basic concepts were then transferred to members of Taking Root and APRODEIN around mapping and GPS work, the computer software, random sampling techniques and the establishment of permanent plots.

Biomass surveys

This exercise was conducted jointly with the project's technicians, members of APRODEIN and Taking Root and local foresters. Joint training activities were carried out and covered the following concepts:

- Identification of land-use and land cover strata
- Compass navigation and basic GPS training
- The use and purpose of random and well distributed sampling techniques.
- Forest measurement techniques, including deadwood.
- Using nested circular and square plots
- Data entry

Participatory threat analysis

With community representatives, members of the community and member of APRODEIN, Taking Root carried out a threat assessment using the pairwise ranking technique to determine the leading causes of deforestation in terms of area and intensity (for greater details, see appendix #10).

Forest plantation establishment and management

The most relevant component to the small-scale producers of the project is the adequate use, planning and silvicultural management of their land developed through their Plan Vivos. The local INAFOR representative and community technicians provide the training.

Monitoring of Plan Vivos

Monitoring of Plan Vivos is carried out by community technicians and internally verified by project technicians, both of which receive training from Taking Root.

Training for the trainers was provided by BioClimate Research and Development (BioClimate). They facilitated and advised on numerous technical components of the project and provided ongoing general guidance.

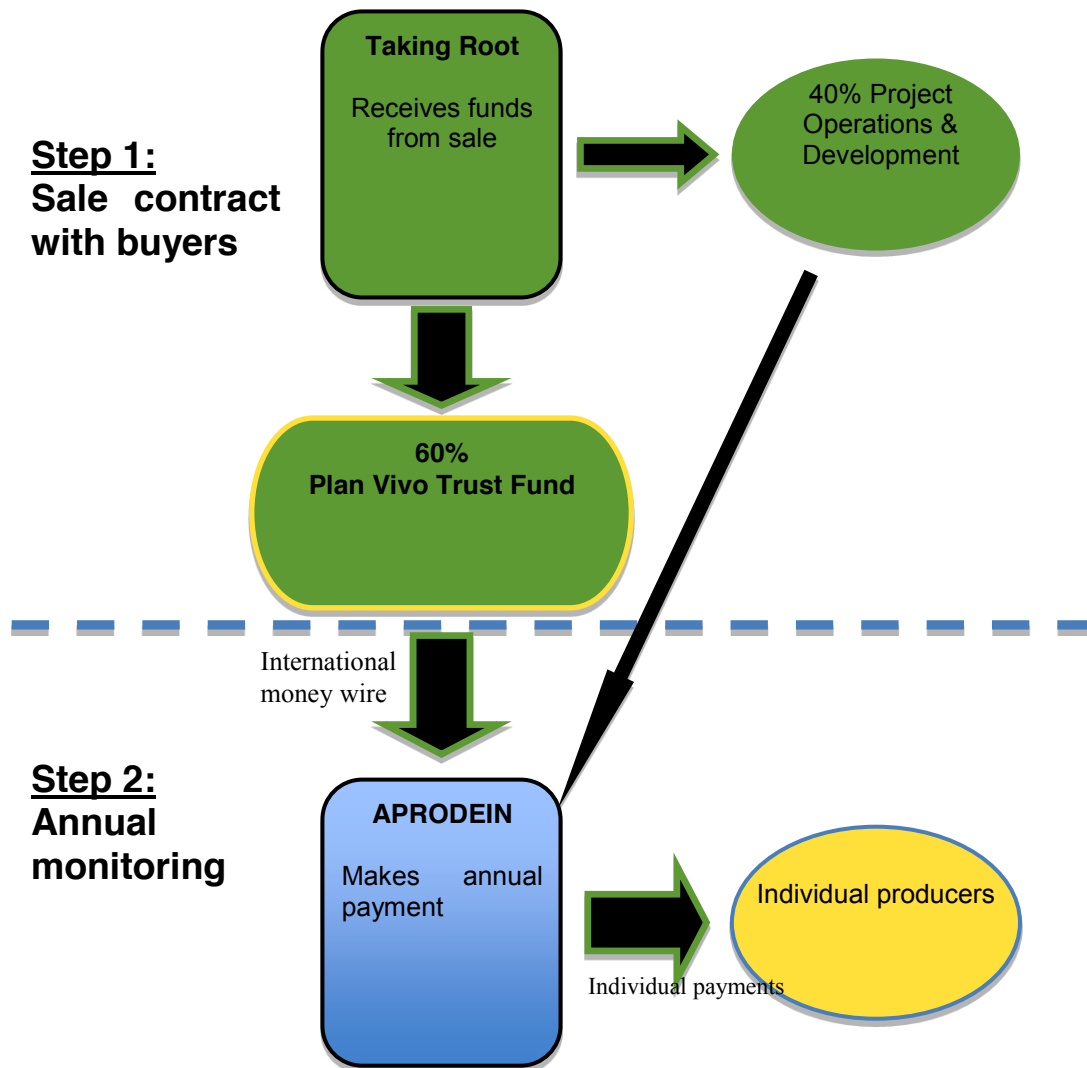
A.13. Project financial structure:

The pilot project was established using funding from a variety of sources notably small grants, private donations and Taking Root internal funding. Future funding is designed to predominantly come from the sale of Plan Vivo Certificates and private investments towards the delivery of future Plan Vivo Certificates.

The use of funds acquired from the sale of Plan Vivo Certificates will be divided into two broad categories. 40% will go to the first category for project operations and development whereas the remaining 60% will go into a separate Plan Vivo Trust Fund. This fund is effectively a distinct Canadian USD savings account administrated by Taking Root and earmarked for payments to producers. After producers reach milestones for the ecosystem services that they provide through the process of annual monitoring, the prescribed payments are wired internationally to APRODEIN. Funds are transferred from APRODEIN to individual producers by writing individual cheques. There are no financial institutions in Limay but producers can cash the cheques with their national identity cards at a bank.

Figure 9

This process is illustrated through the following diagram.



At the beginning of each year, Taking Root signs agreements with producers indicating a set price to be paid per offset generated. This amount represents 60% of the average sale price per offset. However, this average price to be paid cannot be determined until the end of the year when all sales have been made. This means that there is inevitably a discrepancy between the actual average price and the contractual price agreed upon with the producer.

To address this, Taking Root will establish a price paid to producers based on the previous year's average and the upcoming year's forecasted sales. Any surplus earned by the end of the year will be used to cover costs for community-related projects, including, but not limited to, nursery costs and the subsidization of fuel-efficient cook stoves. Such expenditures will be made in consultation with the communities involved and with APRODEIN, and will be reported in the Plan Vivo Annual Report each year.

Plan Vivo Trust Fund (60% of funds)

- **60%** of funds go directly to the participating producers who generate the carbon benefit produced by the new forest plantations. These funds will be distributed periodically over a ten-year period based on annual verifications according to the technical specifications. Prior to disbursement, the money will be kept in a special fund and the interest will be used to cover the financial transaction fees of paying the producers.

Project Operations & Development (40% of funds)

USD \$0.35 is used to cover the issuance and registry fee for each Plan Vivo Certificate generated.

Project coordinator costs

- Salary costs for project coordination staff
- Payments to APRODEIN for site coordinators and field workers/ community technicians /monitoring staff
- Costs of research and other work subcontracted to technical service providers or research and other institutions (e.g. universities)
- Overhead costs related to the project - office infrastructure costs and rents, rates and utilities, IT and telecommunications, professional fees (legal, audit, banking), publicity, stationery and consumables, the cost of hosting community meetings, supplies, travel, subsistence and other expenses related to the project.
- Cover the costs of submitting annual reviews to the Plan Vivo Foundation
- Covering the costs of third party audits
- Helping participating producers develop and access markets for their firewood and sustainably managed forest products
- Submitting new technical specifications
- Holding periodic public and expert consultations
- Other costs related to organisational development

The project will however review the benefit sharing structure from time to time in consultation with the Plan Vivo Foundation. Furthermore, this procedure will be done through continuous consultations within the community and participants are invited to discuss alternative arrangements.

This pricing structure is intended to be transparent and shared with the municipality of Limay and publically available to all.

A.14. Estimated amount of net anthropogenic GHG removals by sinks and/or avoided GHG emissions over the project lifetime:

Table A.14

Technical Specification	Estimated long-term potential carbon benefit t CO ₂ e			
	Areas to be established in Year 1 (ha)	Areas to be established in Year 2 (ha)	Areas to be established in Year 3 (ha)	Total estimated realisable potential
Mixed species forest plantation	40	80	110	68,080
Silvopastoral planting (technical specification not yet developed)	0	0	110	27,500
Barrier Planting	0	20	30	14,800

SECTION B. Duration of the project activity and crediting period

B.1. Proposed duration of project activities and crediting period

Taking Root has been developing reforestation projects with small sale farmers in the municipality of San Juan de Limay since 2007 however the 2010 planting season will be the first year Taking Root generates VERs using the Plan Vivo Standard. The preparation for the 2010 planting season, the development of this Project Document Design and the producers that Taking Root is working with will be considered the pilot project. The establishment of all forest plantations will be completed by mid July 2010. After third party validation and certificate issuance, the project will begin preparations to scale up by starting to identify a much larger number of producers.

Crediting period

This is a long-term project generating ex-ante carbon offsets using the average sequestered volume over the crediting period.

The optimal rotation of the slowest growing species selected in the forest stand is estimated to be twenty years. Therefore any timeframe that is a multiple of 20 years would give the same average quantity of carbon sequestered by the growth of the trees. One of the project's objectives is to use carbon finance to help farmers get through the early years of the plantation before the first saleable forest products are generated. From that point on, the forest in itself is the incentive structure and ensures the perpetual use of sustainable forestry as a more viable land-use option. A crediting period of 40 years (two rotations of twenty years) is chosen with the objective of reducing atmospheric CO₂ concentrations by the year 2050, which is consistent with international climate change policy objectives.

Payment period

Participants receive payments over a ten-year period. Therefore, every year new participants are recruited into the project; Taking Root commits itself for a minimum of ten more years.

Project period

The project has a rolling ten-year project period where each round of payment for ecosystem service agreements that are signed extend the project by ten years.

SECTION C. Technical specifications to be used

C.1. Estimated long-term carbon benefits for project activities, per hectare

Each Technical Specification has its own carbon benefit per hectare. The below table summarises the net carbon benefit for each approved Technical Specification.

Name of Technical Specification	Net carbon benefit per hectare tCO ₂ e
Mixed Species Forest Plantation	296

SECTION D. Measures to ensure permanence and address leakage

D.1. Measures to address risks and ensure permanence

Projects will only succeed if land-use practices are viable over the long-term and provide sustainable economic benefits to communities over and above carbon payments. Activities need to have more than just long-term carbon sequestration benefits; they must be designed as part of an integrated plan for sustainable land-use that incorporates risk management. Producers are given extensive and regular support and training to ensure that ecosystem benefits and sustainable resource-use are not only initiated, but become embedded in the area. Additionally, 15% of the carbon benefit generated is unsold and used as a risk buffer zone against potential early reversal. For greater details, see Tech_specs_V2011-03-11 for the Limay Community Carbon Project. The table below outlines various risk factors to permanence and outlines the mitigation strategy.

Risk Factor	Mitigation Strategy
Legal/Social	
Disputes caused by conflict of project aims/activities with local communities/organisations	Participatory planning and continued stakeholder consultation over project life span.
Land claim disputes	Project works closely with the municipality to ensure clear land tenure.
Project Organisation	
Management of activities not carried out effectively	Project managers and staff adequately trained
Double-counting due to poor record keeping	Transparent record-keeping procedures written in project design document and quality mapping of project activities and area; Up-to-date database maintained with records of all carbon monitored and sold.
Project not practically viable in long-term due to lack of resources/skills/expertise	Careful selection of project staff and training.
Economic	
Rising land-opportunity costs endanger project viability	Development of business plans (reviewed periodically) for economically viable management; Continuous development of markets for forest products.
Financial failure	
Natural	
Fire	Regular plantation clearing to minimize deadwood fuel load plus the local government has recently imposed heavy restrictions on the use of fire to clear land; Furthermore, the forest cover in the area is minimal and isolated making it difficult for fires to spread.
Pests and diseases	Careful selection of tree species.
Extreme climatic events	Site selection criteria; Takes into account of slope of land and proximity to shifting riverbeds.

D.2. Measures to address Leakage:

Since a significant portion of the land area within the project boundary is either not being utilized for any economic activities or if so, very minimally (i.e. occasional firewood collection), leakage is relatively easy to minimize as long as appropriate land use planning is employed. Every participating producer that uses a technical specification is required to demonstrate through the creation of an individual farm management plan (a Plan Vivo) that they have sufficient additional land to provide for their agricultural and pasture needs and sufficient space for reforestation activities.

Both positive and negative leakage needs to be considered as a result of this project. The two principal economic activities that could be responsible for leakage within this project are the increase of pastureland and agricultural land outside the project boundary.

For a complete analysis, see the leakage section of Technical Specifications, Tech_specs_V2011-03-11.

SECTION E. Monitoring and Technical Support Plan

E.1. Monitoring of carbon indicators

Indicator	Measurement
Tree Planting	% Planted
Clearing	% Cleared
Survival	Survival rate
Pruning	% Pruned
Growth	Diameter at breast height (DBH) and height.

During the annual internal verifications, a community technician is responsible for filling out an internal verification report for every producer using this project intervention. Although it is the community technician's responsibility to carry out the internal verification, it is done with the participating producer so that they have a clear understanding of how the process is carried out.

Temporary plots will be chosen randomly from each Plan Vivo, which offers the advantage of being cost effective. Since their locations change randomly every time, producers cannot falsify the results by only caring for the areas within a permanent plot. The disadvantage of using temporary plots is that some precision is lost due to not tracking individual trees over time. Since each producer's Plan Vivo is relatively small, not enough sample plots can be established to effectively determine a confidence level. Therefore, a relatively large portion of the population will be sampled.

E.2. Verification of monitoring

Internal verification: A project technician must check 10% of community technician monitoring reports for inconsistency.

E.3. Technical support and review

Technical Specifications

The technical specifications are developed using local knowledge and experience combined with technical input from the local INAFOR representative, expert consultations with local members of the ministry of the environment (MARENA), the ministry of Agriculture and Forestry (MAGFOR), professionals from APRODEIN and Taking Root. Bioclimate, Research & Development, provided guidance on methodology and accounting methods.

Tree nurseries

APRODEIN professionals provide the overall guidance for the central tree nurseries while professional community technicians execute on-site supervision. Most of the labour is done by the participating producers who are responsible for doing their proportional share of the work depending on the size of their individual project. This helps build local capacity while ensuring quality guidelines are met. In some cases, where individual producers or small groups of individual producers live very far from the central nursery, satellite nurseries are established. These nurseries tend to be more independently run by that group of producers but regular quality guidance is still provided by the community technicians.

Forest Plantation Management

Professional local foresters lead workshops for the community technicians and the participating producers on how to establish and manage the forest plantations at the various stages in their development. Under the general guidance of community technicians, each producer is responsible for the management of their own Plan Vivo however it is not uncommon for various participants to form work parties and take turns working on each other's properties.

E.4. Administrative support

Database management

The community technicians are responsible for making sure the producers meet the requirements of the project, assisting producers in writing their individual Plan Vivos, and digitalizing all of the information. This information is then sent to Taking Root's administrative office for review. Taking Root's office staff is responsible for the database management of PES agreements with producers (for an example, see appendix #4), sale contracts with buyers, the preparation of annual reports and general administration. A modified version of the Plan Vivo database will be used for these purposes (see appendix #6).

For potential participating producers, the database keeps track and records the farmer's name, their Plan Vivo, a copy of their identification card (cedula), verification of their land tenure right, the area dedicated to the prospective technical specification (i.e. the area to be planted), the amount of fencing that they would need and the amount of upfront money that they would require to hire the help they would need to implement the project. A second component of the database tracks the sale of Plan Vivo Certificates. This records who the purchaser is, the quantity purchased, the date purchased, the planting season associated with the purchase, the price purchased and the proportionate amount of money directed towards the Plan Vivo Trust Fund.

SECTION F. Environmental impacts of the proposed activities

F.1. Expected environmental impacts of the proposed activities

The Limay Community Carbon Project takes a holistic approach to land-use management within an area that has suffered from intense environmental degradation for several decades. As a result, the community suffers from heavy soil erosion, water shortages and flooding and a drastic decline in wildlife and tree species. Although carbon finance is used to fund the project, its scope integrates watershed management, sustainable resource use and land use planning. The below table provides a summary of the expected impacts:

Table 5 -Summary of expected impacts of project activities on key environmental services				
Title of technical specification	Biodiversity impacts	Water availability impacts	Soil conservation impacts	Air quality impacts
Mixed Species Forest Plantation	Positive impact: Increase forest cover and thus wildlife habitat through the use of rare native tree species.	Positive impact: Entire project designed around increasing water security by prioritizing critical watersheds and thus reducing the probability of flooding in the wet season and increasing water retention in the dry season.	Positive impact: Forest cycle and use of nitrogen fixing trees continues nourishing the soil while increased forest cover reduces erosion.	Positive impact: Retain humidity and thus reduce particulate matter in the air, particularly in the dry season; Sequester CO ₂ and producer oxygen.

F.2. Monitoring of environmental impacts of the proposed activities

Biodiversity Impacts

Factors that increase biodiversity

- Establishment of mixed species forest plantations on underutilized lands with minimal biodiversity.
- Emphasis is placed on collecting tree specie seeds within the community to promote variation within species.
- Increase in forest cover increases wildlife habitat

Method of assessing ecosystem impacts

Biodiversity and threats to biodiversity surveys.

Soil quality

Factors that increase soil quality

- Increase in forest cover
- Use of nitrogen fixing species

Method of assessing soil quality

Comparison of soil depth, humidity level and nutrient content where the technical specifications take place versus alternative land use scenarios.

Water

Factors that increase water benefits

- Increase in forest cover (increased water retention and decreased evaporation)
- Planting within the vicinity rivers and streams
- Planting within strategic watersheds

Method of assessing water benefits

Regular monitoring of communal and private wells water retention rate.

Air quality

Factors that increase air quality

- Increase in forest cover in community retains humidity, which reduces particulate matter, especially in the dry season.
- Increased forest cover increases oxygen production within communities.

Method of assessing water benefits

The carbon sequestered is directly monitored and quantified through annual monitoring.

SECTION G. Socio-economic impacts of the proposed activities

G.1. Expected socio-economic impacts of the proposed activities

The area of impacts considered for the socio-economic baseline include the following:

Area of impact	Items of measurement
Local incomes	<ul style="list-style-type: none"> • Percentage of households that have electricity • Percentage of households that own their house • Percentage of households that own land <ul style="list-style-type: none"> ○ Less than 2 mazanas (1 manzana = 0.744 hectares) ○ Between 2 and 5 manzanas ○ Between 6 and 10 manzanas ○ Between 11 and 50 manzanas ○ More than 50 manzanas • Illiteracy rate
Local food production	<ul style="list-style-type: none"> • Percentage of households that have improved pasture • Percentage of households that use irrigation
Landless families	<ul style="list-style-type: none"> • Percentage of landless households
Women	<ul style="list-style-type: none"> • Percentage of households with fuel-efficient cook stoves • Percentage of women who own their own house • Percentage of women who own cattle

These methods of measurement were used for the following reasons:

- Percentage of households that own their house:
With a higher income, it becomes possible for those families to build their own house and stop renting or squatting, and it can positively affect their living conditions.
- Percentage of households that own land:
With a higher income, it becomes possible for those families to buy more land and expand their farming, cattle or forestry activities.
- Illiteracy rate:
With a higher income, parents can afford to keep their children in school and give them access to higher education. Adults can also decide to go back to school to learn to read and write in order to better manage their business.
- Percentage of households that have improved pasture:
With the support of Taking Root, participating families will be taught how to manage more sustainably their pastures.
- Percentage of households that use irrigation:
With a higher income, families can decide to invest in different irrigation systems that can increase their land's yield and local food production.
- Percentage of landless households:
With a higher income and a healthier business, participating families can create jobs by hiring members of their communities. Eventually, those employees can save money and become landowners themselves.

- Percentage of households with fuel-efficient stove:
With the support of Taking Root, a fuel-efficient stove will be built in each participant's house.
- Percentage of women who own their own house:
Taking Root wants to evaluate their projects' impacts on women's lives. Will Taking Root's projects increase women's income and make it possible for them to buy land? Will Taking Root's projects have an impact on the sharing of land ownership between men and women?
- Percentage of women who own cattle:
Taking Root wants to evaluate the project's impacts on women's lives. Will Taking Root's projects increase women's income and make it possible for them to buy cattle?

SECTION H. Additional activities supported by the project

H.1. Additional activities to be supported by the project

The Limay Community Carbon Project has two additional components that play an important complementary role to the long-term vision of the project: fuel-efficient cooking stoves and market creation for forest products.

Fuel-efficient cooking stoves

99% of the rural inhabitants of San Juan de Limay use firewood as their main source of energy for cooking. Unlike traditional cooking stoves, the fuel-efficient ones used have a chimney that drastically reduces the amount of smoke released into the households. This alone has huge health benefits for the women who traditionally spend a significant portion of their day preparing food in the kitchen. Additionally, the stoves consume approximately one third of the volume of wood, which reduces pressure of further forest degradation, reduces the amount of CO₂ released into the atmosphere and reduces the amount of time dedicated to collecting the wood.

Market creation for forest products

Part of Taking Root's vision is to use carbon finance as a catalyst towards long-term sustainable land use management and the optimal use of resources. The majority of the land's vocation within the municipality of San Juan de Limay is considered to be ideal for forestry. Due to the relief of the land and the uneven distribution of rainfall, agricultural yields tend to be quite low making the opportunity cost of the land equally low. Conversely, forest species that are well adapted to the region can be very productive despite the environmental conditions while representing a more profitable long-term use of the land. In addition to the lack of local experience of doing so, one of the principal barriers that prevent people from doing this is that the investment period required before paybacks are received is too long. Furthermore, individual producers lack the ability of bringing their product to market and therefore rely on intermediaries that have complete control of the price offered. Through the use of carbon finance, Taking Root works to fill the revenue gap in the early years of a forest plantation while transitioning away from the reliance on international finance for local economic sustainability. By helping the producers identify and transport their sustainably produced forest products directly to market, less distorted price signals should further stimulate the establishment of new reforestation initiatives.

Annexes

Annex 1: List of responsible staff and contact information

Organisation	Key Contact	Participant and position	Nationality	Role
Taking Root Nicaragua	Kahlil Baker kahlil @ takingroot.org	Kahlil Baker, Executive Director	Canadian	Overseeing project implementation and proper development
				Coordinating external reviews
				Developing and maintaining relationships with project funders
				Developing carbon modelling
		Receiving results of monitoring from community technicians and completing any necessary analysis		
		Samuel Gervais, Director of Administration	Canadian	Processing and recording all Plan Vivos
				Maintaining project database
Dave Baumann, Technical Advisor	American	Storing reports and documentation		
		Accounting		
APRODEIN	Elvin Castellon elvincastellon @ yahoo.es	Ronald Martinez, Community Technician	Nicaraguan	Engage families to participate with the project
				Verify and provide land tenure right documentation
				Verify land suitability
				Provide technical training for projects
				Conducting Biomass surveys
				Conducting the annual monitoring
		Collecting other data required by the project		
		Eliezar David Vindel, Project Technician	Nicaraguan	Conduct biomass surveys
				Verify data and reports
Elvin Castellon, President	Nicaraguan	Coordinating ongoing community consultations and training		
		Overseeing all operational components of the project		
		Administering payments to producers		
Municipality	Edwin Martinez edwin.m.corea @ gmail.com	Edwin Martinez Corea, Municipal lawyer	Nicaraguan	Review legal documentation
				Assiste in land title verification
				Provide advice on local legal issues

Annex 2: Information regarding public and other sources of co-funding

Taking Root Nicaragua is an independent not for profit organization with private funding partnerships in North America, Europe, Nicaragua and Australia. Additionally, an increasing number of individuals, private businesses and institutions in Canada form a diversified funding base to support the organizations ongoing activities.

Some financial support from the Canadian public sector was received in the form of grants and wage subsidies.

Annex 3: Technical specifications

See Tech_specs_V2011-03-11

Annex 4: Producer agreement template

See Acuerda_de_venta_3.0 V2010-03-10

Annex 5: Monitoring plan

Appendix5_Monitoring_report_yr1.pdf

Annex 6: Database template

See Appendix6_Taking_Root_Database_Template_2011-03-16

Annex 7. Forest Management Plans

N/A

Annex 8. Permits and legal documentation

See: Appendix8_Alcaldia_Support.pdf

Annex 9. Stakeholders' comments: With the municipality of Limay

Appendix9_attendance_sheet.pdf & Appendix9_Municipality_Limay.pdf

Annex 10. Stakeholders' comments: Community Consultation

Community leaders & Threat assessment

Appendix10_attendance_sheet.pdf & appendix10_community_leaders.pdf

Annex 11. Stakeholders' comments: Community Consultation 2

Producer groups

See Appendix11_attendance_sheet.pdf and appendix11_community_consultation.pdf

Annual Reports

Field Visit Reports

Verification Reports

Corrective Action Reports