REFORESTATION WITH NATIVE SPECIES IN THE PACHIJAL AND MIRA RIVER WATERSHEDS FOR CARBON RETENTION

Project Title	Reforestation with Native Species in the Pachijal and Mira River Watersheds for Carbon Retention
Version	4.2
Date of Issue	30-June-2012 this version of the document issued
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Index to Digital Files that Complete Project Description

Independent Word doc: MCF_RSVP_Rainforest_VCS.doc explains project response to each NCR for the VCS validation process.

Folder 1: MCF-PD and supporting info

- Sub-Folder: Business Plan docs
- Sub-Folder: Communications Under-secretariat Climate Change
- Sub-Folder: Letters of Interest Universities
- Sub-Folder: Methodology and tools
- Sub-Folder: Other Reference Materials
- Documents not in sub-folders
    - MCF-Carbon Calculations.xlsx
    - MCF-BP-VCS Project Description Template - May, 2012.doc
    - MCF-BP-VCS Project Description Template - May, 2012.pdf
    - MCF_GH_VCS_2011.kml

Folder 2: MCF-Risk Analysis and supporting docs

- Sub-Folder: Convenios Firmados Propietarios
- Sub-folder: Ecuadorian laws and other info
- Sub-folder: MCF Legal Standing docs
- Sub-Folder: Telenet-VBV Contract Info
- Documents not in sub-folders
    - MCF_VCS Non-Permanence Risk Report Template, v3.0_0.doc
    - Opportunity Costs_Calc.xlsx

Folder 3:_MCF_PD_GIS

- Includes high-resolution jpg format of all maps used in Project Description

Folder 4:_MCF_PGMF

Picture Credits

1. Fire station at San Geronimo, October 2010, Brian Krohnke
2. Luis Pérez, Santa Rosa de Mindo, Stratum 1, March 2011, Brian Krohnke
3. Pasture, Santa Rosa de Mindo, Stratum 1, March 2011, Brian Krohnke
4. Club-winged Manakin at Milpe, 2009, Nick Athanas
5. Tanager Finch at Santa Rosa de Mindo, 2008, Steve Blain
6. Long-wattled Umbrellabird at Milpe, 2010, Dr. Jorge Cruz
7. Guayaquil Wooodpecker at Rio Silanche, 2009, Sam Woods
8. Grassland in San Geronimo, July 2009, Brian Krohnke
9. Peter Ramos at San Geronimo, August 2010, Steven Heyvaert © BOS+ tropen
10. Gerardo Cuasapaz at San Geronimo, 2011, Brian Krohnke
11. Blanca Cuasquer at San Geronimo, 2012, Brian Krohnke
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19. -20 Procedural GIS, 2009, Ecopar
21. Grassland at San Geronimo, 2011, Brian Krohnke

Acknowledgements

Special thanks to Forestry Engineer Leila López for her help in creating version 2 of this project in 2009.

Special thanks to Forestry Engineer Luis Ortiz, Gerardo Cuasapaz, Ing. Ángel Suco, Hipólito Arias and all the people who put some sweat into the first plantings.

Great thanks to Tiny Footprint Coffee, the first funders to begin neutralizing their emissions with us.

Many thanks to the Flemish Government for supporting the preliminary work within the framework of the Flemish Fund for Tropical Forests.

Final thanks to Telenet, obviously.

1 PROJECT DETAILS

1.1 Summary Description of the Project

This project activity groups together 13 private landowners to reforest with native species 346 hectares of degraded grasslands in two different areas of the western slope of the Andean mountains in Ecuador: the Río Pachijal and Río Mira watersheds in Pichincha and Imbabura provinces, respectively. In the broadest sense, the project is divided into 5 strata, 3 in Pichincha province with generally more favorable, weather and soil conditions and 2 in Imbabura province with generally more degraded, eroded and dry conditions. These disparate environmental realities are also characterized by greater biotic wealth and diversity in strata 1-3 (Pichincha) contrasted with species poverty in strata 4-5 (Imbabura). As with the disparate ecological reality between the two provinces, they also are disparate in terms of their basic socio-economic realities, with greater prosperity in Pichincha and greater poverty in Imbabura. This distinction is important as the project strata are aligned along two, essentially parallel, transects that are only some 100 km apart running down the western flanks of the Andes to the northwest of the Pichincha volcano and Cotacachi volcano massifs. The project asks the question: Can the voluntary carbon market help drive habitat restoration and reforestation while contributing to increased human welfare in two neighboring regions?

Specifically, the project´s Climate, Community and Biodiversity goals are the following:

1. Climate
    a. To mitigate global warming by planting trees for sequestration of GHGs.
    b. To voluntarily neutralize the GHG emissions of project sponsors.
2. Community
    a. To increase income, provide employment opportunities, and as a result to help alleviate poverty in rural communities.
    b. To improve ecosystem services related to forests, such as erosion prevention and water availability, for residents of the project zone.
    c. To create a community of knowledge and interchange amongst the various project contributors. This is the first Ecuadorian reforestation project with native species on this scale and allows for interesting learning opportunities for universities, local people and government institutions. -- Four universities (both European and Ecuadorian) will have different roles in project execution and monitoring.
    d. Local labor forces and project land owners will be trained in the technical and safety aspects of reforestation activities and forest management.
    e. Project landowners will create a community of knowledge and information sharing as to the project and the results of the commercialization of the greenhouse gas removals it represents.
    f. Awareness regarding the importance of forests for welfare of local people and global climate will be raised.
3. Biodiversity
    a. To convert marginal and degraded grasslands into valuable natural forest habitat and connect intact forests with high biodiversity.

b. The different parcels that make up the project boundary in Pichincha province are all part of important bird habitats and will help guarantee their long-term viability. As the project is able to secure further funding it will enact sub-projects that bolster this aim.
c. The habitat found in the project zone in Imbabura province is severely degraded and reforestation will increase natural habitat and enable connectivity between remnant cloud forests in the region.

As a means to objectively demonstrate and communicate our pursuit of the above listed goals this project aims to obtain both Verified Carbon Standard validation and validation to the Climate, Community, Biodiversity Alliance´s standards. To that end, we follow the VCS Project Description format, and in **Annex 1 "CCB Compliance Key"**, we annotate how this project meets each of the 14 required CCB criteria, and how we propose meeting optional standard GL3 of the CCB to achieve Gold Standard status.

1.1.1 Climate objectives

This project aims to neutralize or compensate the Green House Gas emissions of its 2 sponsors and estimates removals of just under 7,000 tCO2e metric tons as a yearly average for 30 years. With project success both of these sponsoring companies aim to become carbon neutral or carbon negative in their activities and we will generate a win-win-win scenario with climate change mitigation at the forefront, then positive community impacts, followed by habitat restoration and creation.

Project proponent has selected the following methodology for this project design: CDM Executive Board AR-AMS0007 / Version 01.0.1, EB 56, Annex 10, 17 June 2011. As demonstrated throughout project documentation the proposed project activities meet the various requirements posited by this methodology. Also, as the project is designed to grow and the project proponent has contracts for further funding of an additional 200 hectares, approximately, the project's net GHG removals will grow considerably in coming years.

1.1.2 Community objectives

As mentioned in the introductory paragraph above, the communities found in 5 project strata all have different ecological and socio-economic realities, and this project has different degrees and kinds of interaction with each of them. This issue has guided the definition of the project zones as mapped in section 1.9 Project Location and summarized in the table "Definition of Project Area and Zone.xlsx" found in the sub-folder "Other Reference Materials."The local population in Pichincha is overwhelmingly of 'mestizo' origin while in Imbabura there is a large percentage of people who describe themselves as afro-Ecuadorians.

For three years between mid-2011 and mid-2014 project will invest roughly $850,000 USD with more than 80% going directly into field work in rural communities with high poverty levels. This aspect will be quantified on an ongoing basis as monitoring and other field visits by project personnel and visiting students will increase the total inflow of funds over this initial amount. This is direct foreign income that will have a positive multiplier effect in these communities. Then, for the remainder of the crediting period, the project will continue to invest in incentive payments to landowners, monitoring visits and other means to bring new income to these communities.

By improving water catchment in all strata, but especially in strata 2 and 5 the project will directly improve the quality and abundance of water available to the neighboring communities. This aspect will be documented more thoroughly during project monitoring in cooperation with the Programa del Manejo del Agua y del Suelo (Promas, Universidad de Cuenca, Prof. Felipe Cisneros).

Since project start in November, 2011, work crews have received basic training in reforestation and going forward maintenance crews and landowners will also receive training regarding forestry issues. Further, in stratum 5, project participant and work crew leader, Gerardo Cuasapaz and his family will receive training in the implementation and management of a modern and efficient tree nursery to provide project trees.

Beyond the traditional, geographic, conception of community this project aims to build personal and professional ties between two Ecuadorian (the Northern Technical University of Ibarra and the University of Cuenca) and two Belgian universities (the Catholic University of Leuven, the University of Ghent) to create a community of knowledge with participation in CO_2, biodiversity and community impact monitoring. While the idea is to grow these relations into formal cooperation agreements (as shown in sub-folder: "Letters of Interest Universities"), for initial project implementation stage, this relation will include the participation of two project interns from Belgium beginning July, 2012, and also we await the participation from interns from the forestry school of Ecuador´s Northern Technical University (UTN).

Also, this coming community of knowledge will include participating landowners who will be invited to learn about the project and have access to both scientific and economic information regarding the actual net removals and other important aspects the project generates over the 30 year project period. The local people will also be involved in the broader project network of policy makers (local, provincial and maybe national) and academicians (national and international) within the monitoring frame work (data collection and analysis).

As shown, the project foresees net positive community impacts and especially regarding the creation of jobs in the project zone. The High Conservation Values in the project zone identified by the different communities during the various consultation meetings will all be protected in differing degrees by project activity.[1] The HCVs can be summarized as 2 different Important Bird Areas, high numbers of threatened and endangered bird species, two vulnerable and 4 near threatened mammal species, and the critical environmental services of specific water catchments and erosion protection in a watershed listed as in danger of desertification.

Project proponent underlines that this project takes place on discrete, private lands in small units over a relatively large geographic area. This, perhaps unique, project structure has created the need for strict limits on the PP´s definition of the Project Zone (as regarding the CCB standards), such that the zones in each strata are limited and only include local communities that are directly impacted by their sheer physical proximity to the project activities and by their participation in them.

[1] In the file Table HCV.xlsx found in the digital folder Other Reference Materials.

1.1.3 Biodiversity objectives

While the project's geographical range does present some operational challenges, it also affords several unique opportunities to compare and contrast biodiversity recuperation as a result of the project's reforestation efforts over a range of environmental conditions. The Pachijal and Mira watersheds conform parts of two parallel altitudinal transects running between six Birdlife International designated Important Bird Areas (IBAs) in Northwestern Ecuador:[2]

Table 1: Situation of project area with reference to IBAs

Pichincha Province	**Imbabura and Carchi Province**
Caoní River (EC040)	Awa Ethnic Territory and Surroundings (IBA EC002)
Los Bancos – Milpe (EC041)	Cotacachi – Cayapas Ecological Reserve (IBA EC037)
Mindo and the Flanks of Pichincha (EC043)	El Angel – Cerro Golondrinas (IBA EC036)

Seen otherwise, these transects also connect the Tropical Andes and Tumbes-Chocó-Magdalena biodiversity "Hotspots" as characterized by Conservation International.[3] In restoring and protecting bird habitat in this highly diverse region of this mega-diverse country this project meets the Vulnerability Criteria of optional standard GL3 of the CCB.[4]

The specific project impacts on different members of the faunal community will vary stratum by stratum, however there is great similarity in the potential species lists, as we view our different strata as points on ecological transects from higher to lower on the western Andean slopes. Again, as stated above, the reality of the two altitudinal transects followed can be described simply as: Of the 5 project strata there are 3 in Pichincha province with generally more favorable, wetter environmental conditions and 2 in Imbabura province with generally more degraded, eroded and dry conditions. These disparate environmental realities are also characterized by greater biotic wealth and diversity in strata 1-3 (Pichincha) contrasted with species poverty in strata 4-5 (Imbabura). However, improved forest connectivity in all strata will help assure population sustainability of various taxa.

As project proponent, Mindo Cloudforest Foundation, is a group with great expertise in the Ecuadorian avifauna[5], and bird populations are widely used as indicators of habitat health[6,7,8,9]

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[2] *Áreas Importantes para la Conservación de las Aves en los Andes Tropicales*, BirdLife International, 2005.
[3] http://www.conservation.org/where/south_america/ecuador/pages/ecuador.aspx
[4] More information in Annexes 1-2.
[5] "La Estrategia Nacional para el Manejo y el Desarrollo Sostenible de Aviturismo en el Ecuador", copyright MCF and CORPEI, 2006, and the "Actualización de la Estrategia Nacional de Avitourism, 2010", author MCF. Both documents published by the Ecuadorian Ministry of Tourism. And, founding member Paul Greenfield is co-author of The Birds of Ecuador, Cornell University Press, Ithaca. Copyright © 2001 by Robert Ridgely and Paul Greenfield.
[6] Sierra R. Felipe Campos y Jordan Chambelán. *Áreas Prioritarias para la Conservación de la Biodiversidad en el Ecuador Continental,* 1999"
[7] Armando Chamorro Rosero, Angel Jácome Mena, Carlos Carrera Reyes. Guía para la identificación y manejo de bosques de alto valor de conservación en Ecuador. CDC Ecuador Alianza Jatun Sacha. 2005
[8] Eken, G., Bennun, L., Brooks, T.M., Darwall, W., Fishpool, L.D.C., Foster, M., Knox, D., Langhammer, P., Matiku, P., Radford, E., Salaman, P., Sechrest, W., Smith, M.L., Spector, S., Tordoff, A. 2004. Key biodiversity areas as site conservation targets. *Bioscience* 54, 1110-1118.
[9] Langhammer, P.F., Bakarr, M.I., Bennun, L., Brooks, T.M., Clay, R.P., Darwall, W., De Silva, N., Edgar, G.J., Eken, G., Fishpool, L.D.C., da Fonseca, G.A.B., Foster, M.N., Knox, D.H., Matiku, P., Redford, E.A., Rodrigues, A.S.L., Salaman, P., Sechrest, W., Tordoff, A.W. 2007. Identification and Gap Analysis of Key Biodiversity Areas: Targets for Comprehensive Protected Area Systems (Best Practice Protected Area Guidelines). IUCN, Gland, Switzerland.

project will monitor the recuperation of bird species diversity, especially within the project boundary in strata 4-5 as compared to that found in strata 1-3. While the main interest and strengths of the PP lie in the observation and monitoring of avifaunal populations, the project will also involve the observation and monitoring of additional taxa, in part depending on the interests and experience of the universities involved in project monitoring over the coming years.

For stratum 4 and 5 in general we have found that very limited published information on present biodiversity is available since these are quite degraded terrains and have not, apparently, provoked the interest of biologists. However, PP observations during all phases of project development and initial implementation have been recorded as regarding bird species present in the area, and neighbors and residents of the project zone have been consulted. This species poverty also implies that project activity will have greater positive impact on biodiversity and the monitoring activities will greatly increase knowledge on the impact of reforestation activity on biodiversity recuperation under the different environmental conditions faced in the project zone. A basic Biodiversity Monitoring Plan has been described in 4.3.8 and will be developed in further detail and executed over the coming year as allowed by the CCB standards. It is the PP's hypothesis that in all strata the project will improve forest connectivity between existing natural forests and help assure population sustainability of various taxa.

1.2 Sectoral Scope and Project Type

Sectoral Scope 14: Agriculture Forestry and Other Land Use.
Project Type: Afforestation, Reforestation and Revegetation (ARR).
Pursuant definitions in VCS Standard: VCS Version 3.2, section 3.4, this is a grouped project.

1.3 Project Proponent

Project Developer: Mindo Cloudforest Foundation (MCF)
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1.4 Project Proponent #2

Project partner organization: BOS+ [10]
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[10] Both Belgian organizations previously involved in the project, Groenhart vzw and Vereniging voor Bos in Vlaanderen (VBV) have recently merged into one organization, named BOS+, still pursuing the same objectives of more and better forests in Flanders and the tropics. More info can be found on their website www.bosplus.be.

1.5 Project Start Date

November 1st, 2011

1.6 Project Crediting Period

30 year crediting period beginning November 1st, 2011 and ending October 31th, 2041.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	X
Mega-project	

Table 2: Estimated GHG Emission Reductions or Removals[11]

Years	Estimated GHG emission reductions or removals (tCO2e)
2011	0.00
2012	7574.86
2013	7574.86
2014	7574.86
2015	7574.86
2016	7574.86
2017	7574.86
2018	7574.86
2019	7574.86
2020	7574.86
2021	7574.86
2022	7574.86
2023	7574.86
2024	7574.86
2025	7574.86
2026	7574.86
2027	7574.86
2028	7574.86
2029	7574.86
2030	7574.86
2031	7574.86
2032	5768.65
2033	5768.65
2034	5768.65
2035	5768.65
2036	5768.65
2037	5768.65
2038	5768.65
2039	5768.65
2040	5768.65

[11] Detailed calculations can be found in the attached file “MCF-Carbon Calculations.xls”

2041	5768.65
Total estimated ERs	**209184**
Total number of crediting years	**30**
Average annual ERs	**6973**

1.8 Description of the Project Activity

Project involves the planting of native tree species on 346 hectares of unproductive and degraded grasslands on 13 discrete properties in 5 cantons in 2 provinces: Cantons Quito, San Miguel de Los Bancos, Pedro Vicente Maldonado and Puerto Quito in Pichincha Province and Canton Ibarra in Imbabura.[12] In addition to the summary found here, there is far more detailed information regarding the project activity available in "PGMF_CarbonNeg_JUNIO.docx" found in supporting documents accompanying this project description.

The establishment of native forests on what are currently grasslands will capture atmospheric CO_2 creating net GHG removals by sinks. The 30 year crediting period will also be augmented as most participants plan to manage their forests for habitat conservation on a permanent basis.

In the 5 strata identified, *ex ante*, there will be many similarities in planting techniques but also many differences as each individual case requires. **The similarities include**:

- Native species trees from local, private nurseries;[13]
- Planting on contour lines;
- 25 cm x 25 cm x 30 cm plant hole with 50 cm X 50 cm plant crown;
- Use of 90 g of organic fertilizer in some of the planting holes depending on tree species;
- 1,000 project trees per hectare;
- Where project spacing coincides with existing tree, a 1.5 meter buffer will be given to existing tree to permit accurate baseline calculation and successful monitoring: In accordance with Annex 16 "GUIDANCE ON CONDITIONS UNDER WHICH THE CHANGE IN CARBON STOCKS IN EXISTING LIVE WOODY VEGETATION ARE INSIGNIFICANT."
- Local work crews hired temporarily for site preparation and planting with a remainder crew hired full-time for 2 plus years of plantation maintenance to guarantee the successful establishment of trees;
- Plant species have been selected due to various factors including ease of reproduction, growth rates, resistance to fire and wind and participating landowners´ desires and in accordance with the various microclimates of the different parcels, relative soil degradation, and other local factors. Tree species are > 85% native, and in the case of stratum 3, 100% native and produced on site from local seed sources. The exception to this native species rule will be the use of casuarinas (*Casuarina equisetifolia*) as 40% of

[12] The high number of cantons is somewhat an anomaly as Rancho Suamox, stratum 3, is located half in Pedro Vicente Maldonado and half in Puerto Quito. Without this one property there would be only two cantons involved in Pichincha. Also the La Yumbada and Richard Parsons properties are the only ones in Canton Quito.
[13] More complete species lists are included in "PGMF_CarbonNeg_JUNIO.docx". As acquiring seed and saplings for many native tree species is difficult, some deviation from the list and stated percentages of species is expected.

trees in stratum 4 Salinas (8% project total) and *Alnus nepalensis* as 21% of project trees in strata 1-2 and less than 7% of total project trees.

- 25% mortality calculation for replanting in the second year.

The differences or individual characteristics of the project activity in each stratum are discussed briefly below and in greater detail in the General Forest Management Plan[14]:

Stratum 1 in Santa Rosa de Mindo includes the properties of project director Brian Krohnke, Grecia Flores, Marcelo Vásconez and Richard Parsons, total 70 hectares. This is the highest elevation stratum between 2,000-2,300 meters, and the species that will be planted here are: *Alnus nepalensis, Inga Sp, Croton lechleri, Vismea sp, Carapa guianensis*, *Erythrina sp.*, various *Miconia sp*, *Cedrela montana* and several other hardwoods depending on seed availability on a 3m X 3m grid. Seeds are being collected from forests adjacent to the project boundary with the exception of the exotic Alnus which is being sourced in nearby Intag valley of Imbabura province where it has been present and shown to be non-invasive for more than 20 years.

Stratum 2 of Ramiro Salazar, Piedras Negras and La Yumbada S.A. will use essentially the same plant species as Stratum 1, but is located slightly lower in altitude with its 51 hectares at ca. 1,700-1,900 meters.

The saplings for **Stratum 3** of Rafael Ferro will mostly be produced in temporary nurseries on site from local seed sources. Forestry strategy will include the use of many pioneer species that help dominate the grass, create shade and forest soil as quickly as possible. At 350-400 meters altitude this happens in a matter of only a few years. Along with *Carapa guianensis*, various *Miconia sp, Inga Sp, Swietenia macrophylla* plantation will include *Virola dixonii o Virola sp* (Caracha Coco), *Tabebuia crysantha* (Guayacán), *Symphonia globulifera* (Azufre), *Gliricidia sepium* and local favorites Sapán de Paloma, Uvita de Monte and Clavellín. Also, a nearby nursery will provide *Cordia alliodora.*

Stratum 4, the property of Ximena Enríquez in Salinas parish, is radically different ecologically, but will also employ *Inga sp* as well as *Shinus molle*, *Acacia macracantha, Cedrela montana*, *Juglans neotropica* (Nogal), *Caesalpinia spinosa* (Guarango or Tara), *Tecoma stans, Sapindus saponaria* and more densely planted windbreaks of *Casuarina equisetifolia*. This use of casuarina is one of two uses of exotic species by the project, and casuarinas have been present in Salinas for decades and have shown themselves highly useful in creating windbreaks and growing to great size, helping to create favorable micro-climates and to establish the rest of the plantation, capturing atmospheric CO_2 at the same time.

This seasonally arid stratum will also require the use of humidity retaining gels and irrigation from a new reservoir built by Ximena as she plans to farm areas adjacent to the reforestation lands and also eventually plant shade coffee in parts of the reforestation parcel. In essence, project monies not invested in grass clearing and maintaining plant-crowns will be invested in watering project plants.

[14] Ibid.

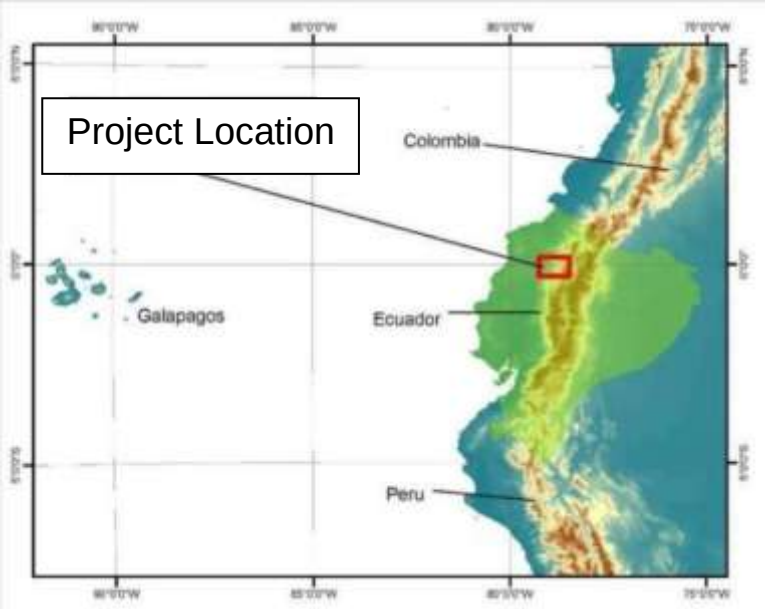
Picture 1

Stratum 5, San Gerónimo and surrounding areas in La Carolina parish at 900-1200 meters altitude will be planted with *Inga sp, Cordia alliodora, Acacia macracantha, Cedrela odorata, Psidium guajava*, *Gliricidia sepium, Jacaranda copaiba,* and *Sapindus saponaria*. This stratum while very wet in winter or rainy-season months, usually has a prolonged and windy dry-season, and humidity retaining polymer gels will also be employed. This grassland will not be cleared but only the area sufficient for plant crowns and their maintenance. Five meter wide firebreaks will be created and maintained at plantation borders and community outreach will include Municipality, Parish Board (*Junta Parroquial*) local fire department, special anti-narcotics police and Ministry of Environment officials to help mitigate the risk of fire to project plantations.

It's important to mention that in 2009 a new fire station was built in San Gerónimo, and it began to operate in 2010 (shown in Picture 1). Local residents report that there has been only very limited burning of grasslands in the last couple years contrasting with earlier experience and contrasting greatly with grasslands in neighboring Carchi province where extensive burns are still common during dry months. Picture 9 of Peter Ramos in section 1.1 shows hillsides in Carchi burning while Peter is standing next to the public school in San Gerónimo. This reduction in the use of fire demonstrates a moment of social change and also represents an opportunity for this project.

1.9 Project Location

This reforestation project will take place in two different areas of the western slope of the Andean mountains in Ecuador: the Río Pachijal and Río Mira watersheds in Pichincha and Imbabura provinces, respectively.[15] Three important definitions must be kept clear so as to correctly understand this project's location: 1.- **Project Area** Location where project activities are realized and which is under control of the project proponent; 2.- **Project Zone** as defined by the CCBA standards meaning the surface over which the project causes impacts; 3.- **Project Boundary** as defined by VCS meaning the precise area where the project activity takes place. We use this definition as synonymous with the **CCB** definition of "Project Area", the specific locale of the project's investments and in this case, tree planting. For this project description template, maps and other information relevant the Project Boundary/Area are given in section **2.3. Project Boundary**.



Map 1: Project location (national level)

In this current section **1.9 Project Location** there are a series of maps that take us from the generally stated, project region, then with increasing detail to the **Project Zone** which is necessary to understand the following discussion in section **1.10 Conditions Prior to Project Initiation**.

Generally, **Pichincha province** straddles the equator and both the Eastern and Western cordilleras of the Andes. All project lands in Pichincha are on the Western slope of the Andes. As shown in Map 2. Pichincha is also home to Quito, the capital of Ecuador. **Imbabura province** is

Map 2: Project location (provincial level)

[15] Strictly speaking Rancho Suamox, stratum 3 lies just outside of the Pachijal watershed and the La Yumbada property begins at the edge of the Pachijal then forms the top of the Tulipe river watershed. Also in stratum 2, Piedras Negras is in the adjacent Mindo river watershed but Ramiro Salazar's Sachatamia property is within the Pachijal. The road between the two properties is the dividing line.

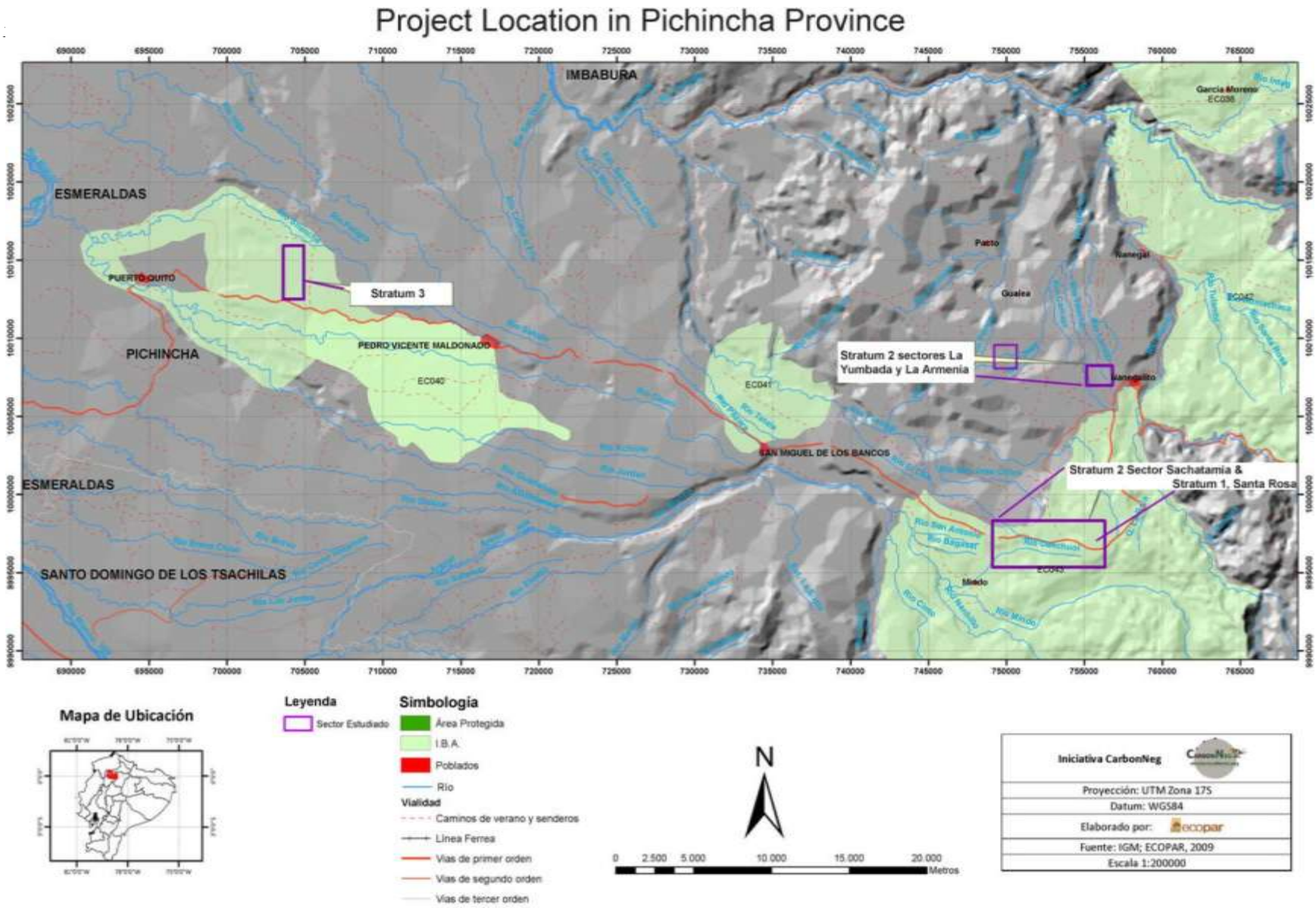
immediately adjacent to Pichincha going north. All project lands in Imbabura are either at the Western edge of the Inter-Andean valley or on the Western slope of the Andes. Maps 3 and 4 show the location of the different strata and include the Important Bird Areas listed in Table 1. Maps 5 to 9 show the different strata with project area and project zone in more detail on relief maps.

The different strata were determined by geographical and altitudinal proximity and by ecological similarity. The selected, approved small-scale methodology AR-AMS0007 / Version 01.0.1 simply states: "Stratification of the planned project area for baseline estimation is not required but may be carried out if it improves the accuracy and precision of biomass estimation."

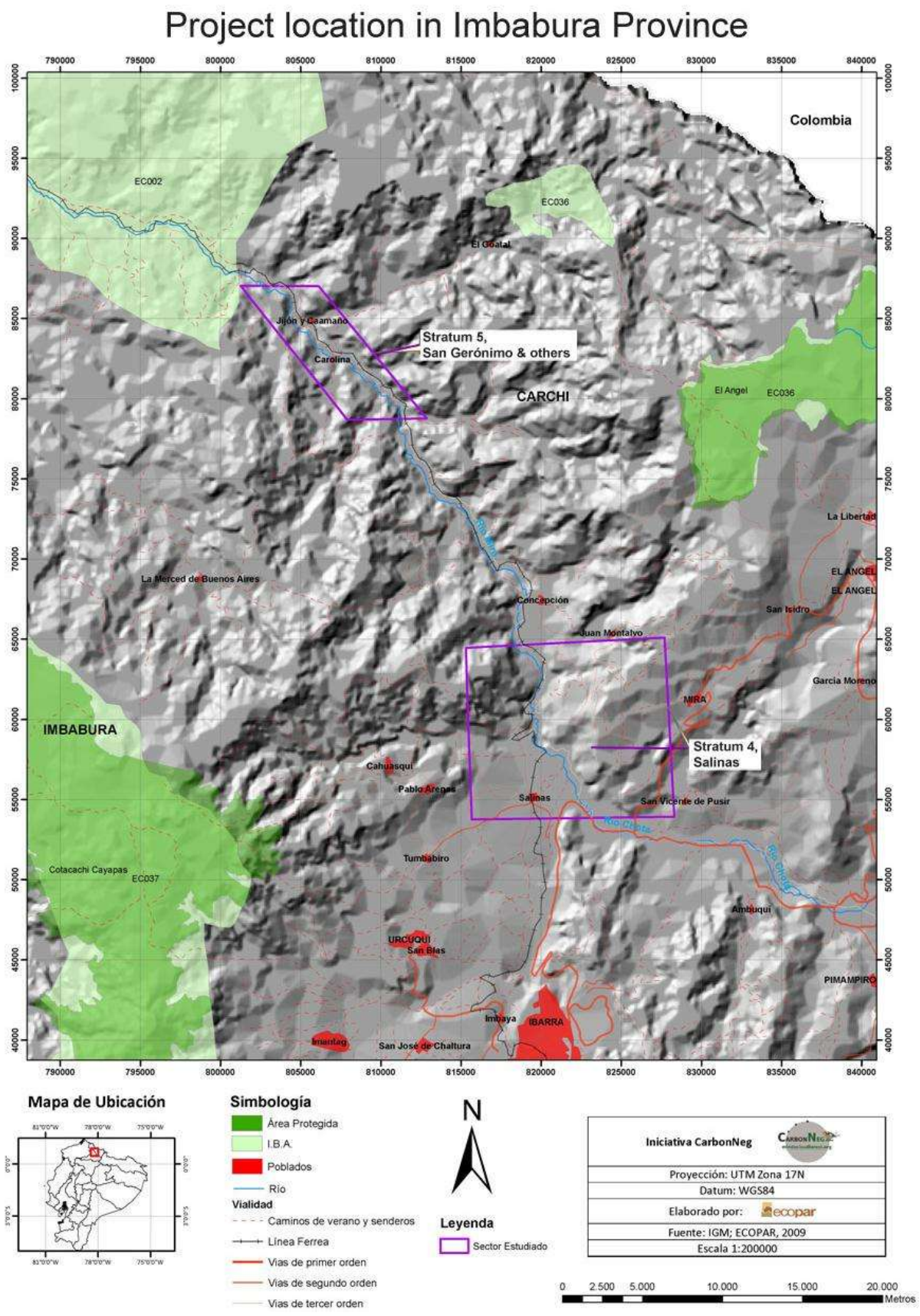
The project strata are as follows:

Table 3:Project strata

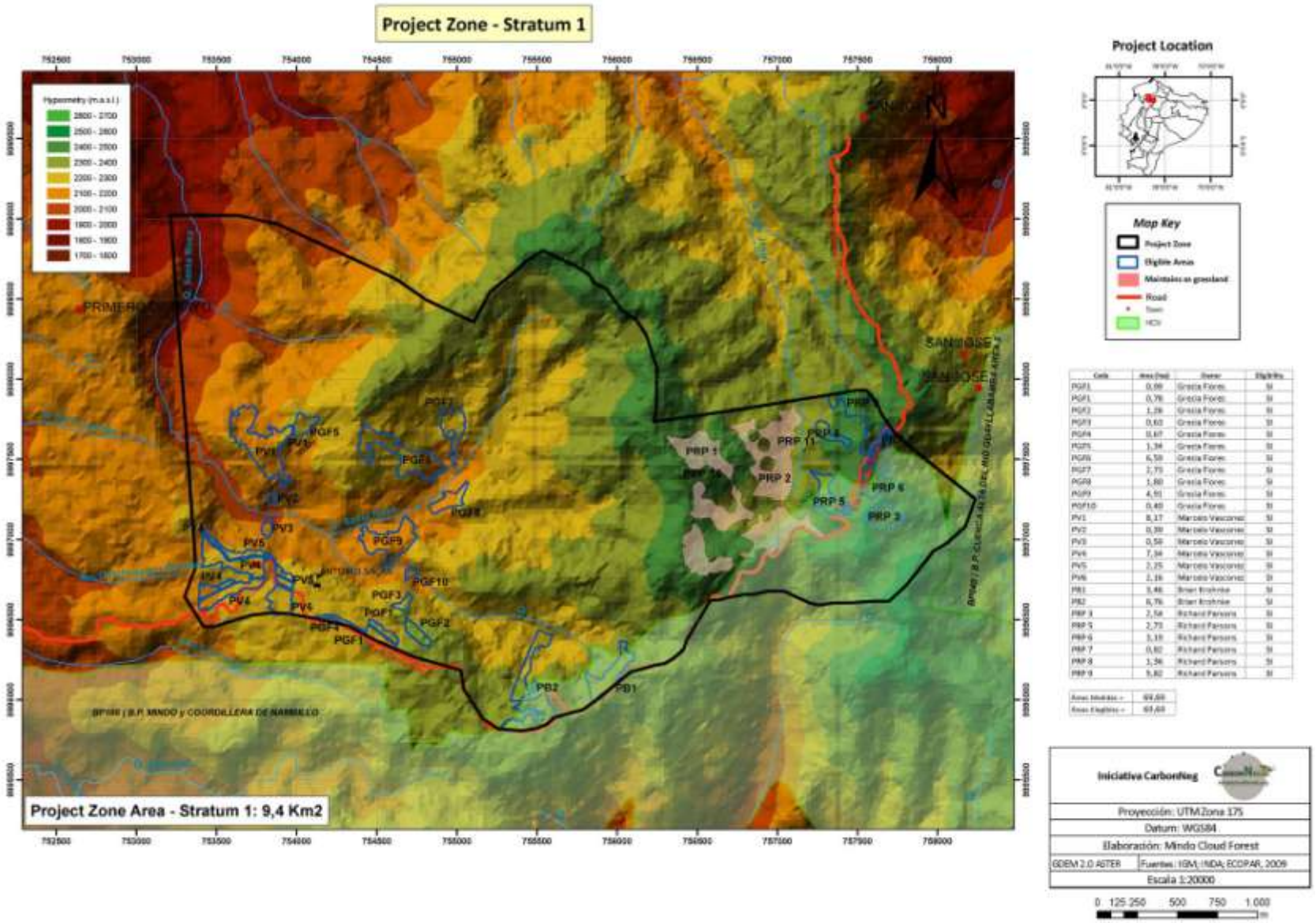
Pichincha Province						Total ha. Strata	Habitat Type
Canton	Parish	Sector	Name	Stratum	Hectares		
SM Los Bancos	Mindo	Sta. Rosa	Brian Krohnke	1	10.2		Montane rainforest
SM Los Bancos	Mindo	Sta. Rosa	Grecia Flores	1	22.1		
SM Los Bancos	Mindo	Sta. Rosa	Marcelo Vasconez	1	20.9		
Quito	Nanegalito	San José	Richard Parsons	1	16.5		
CENTER OF STRATUM 1		Lat. 0°1'24,238"S	Longitude 78°42'22,417'' W			69.7	
SM Los Bancos	Mindo	San Tadeo	Ramiro Salazar	2a	8.2		Subtropical rainforest
SM Los Bancos	Mindo	San Tadeo	Piedras Negras	2a	28.9		
CENTER OF STRATUM 2a		Lat. 0°2'0,622"S	Longitude 78°45'0,897''W				
Quito	Gualea	Las Tolas	La Yumbada	2b	14.3		
CENTER OF STRATUM 2b		Lat. 0°4'3,782"N	Longitude 78°46'19,958''W			51.4	
Pedro Vicente Maldonado	PVM	Marianitas	Rafael Ferro	3	42.7		Lowlands rainforest
CENTER OF STRATUM 3		Lat. 0°8'13,231"N	Longitude 79°10'3,513''W			42.7	
TOTAL PICHINCHA						163.8	
Imbabura Province						Total ha. Strata	
Canton	Parish	Sector	Name	Stratum	Hectares		
Ibarra	Salinas	Salinas	Ximena Enríquez	4	67.0		Arid seas-onal rains
CENTER OF STRATUM 4		Lat. 0°32'29,300"N	Longitude 78°8'8,472''W			67.0	
Ibarra	La Carolina	San Gerónimo	Richard Wheeler	5	77.0		Subtropical rainforest with prolonged dry season
Ibarra	La Carolina	San Gerónimo	Thelmo Grijalva	5	17.0		
Ibarra	La Carolina	San Gerónimo	Eduardo Moreno	5	9.0		
Ibarra	La Carolina	San Gerónimo	Gerardo Cuasapaz	5	13.0		
CENTER OF STRATUM 5		Lat. 0°44'20,676"N	Longitude 78°14'15,411''W			116.0	
TOTAL IMBABURA						183.0	
TOTAL TWO PROVINCES						346.8	



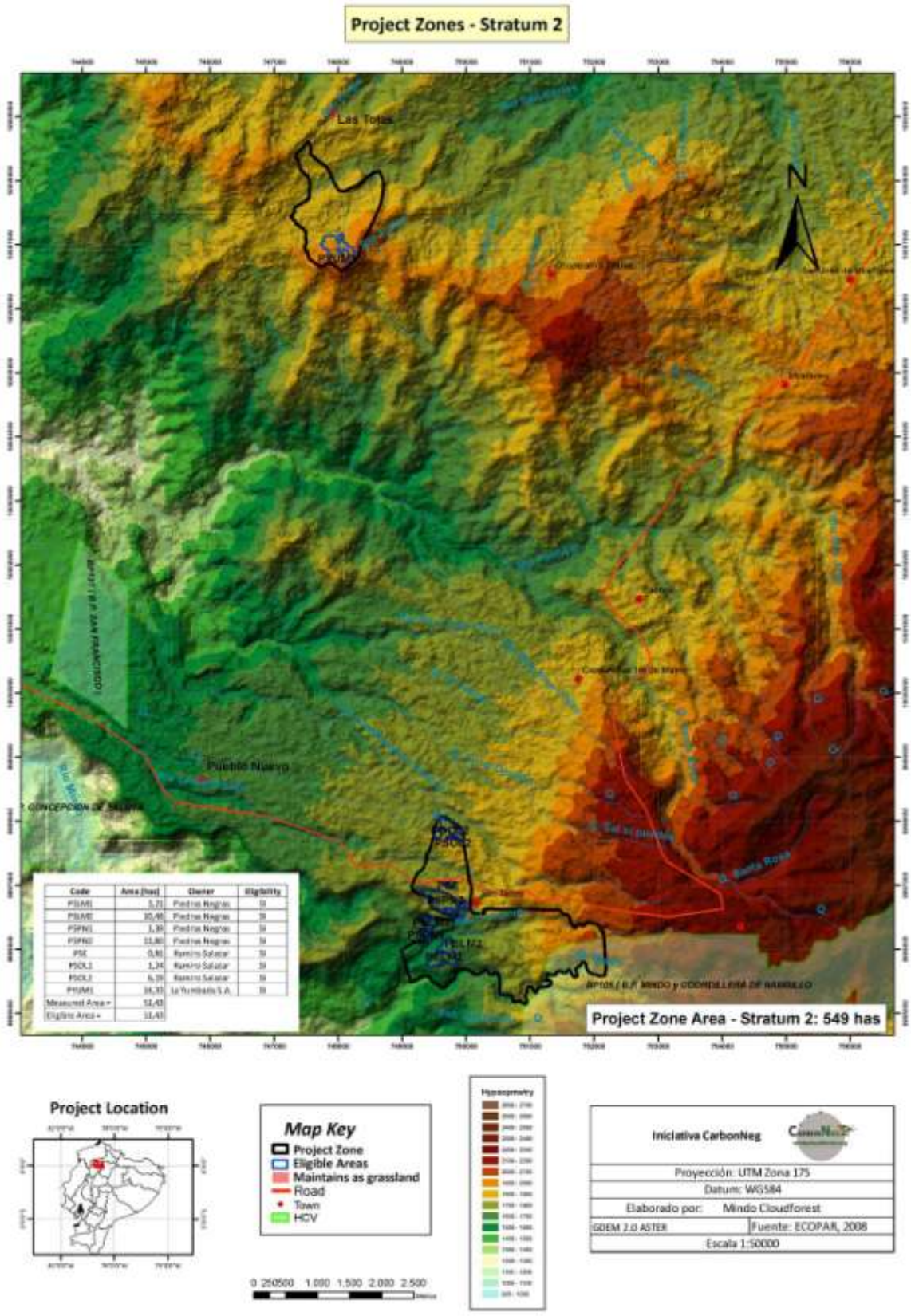
Map 3: Project location in Pichincha province



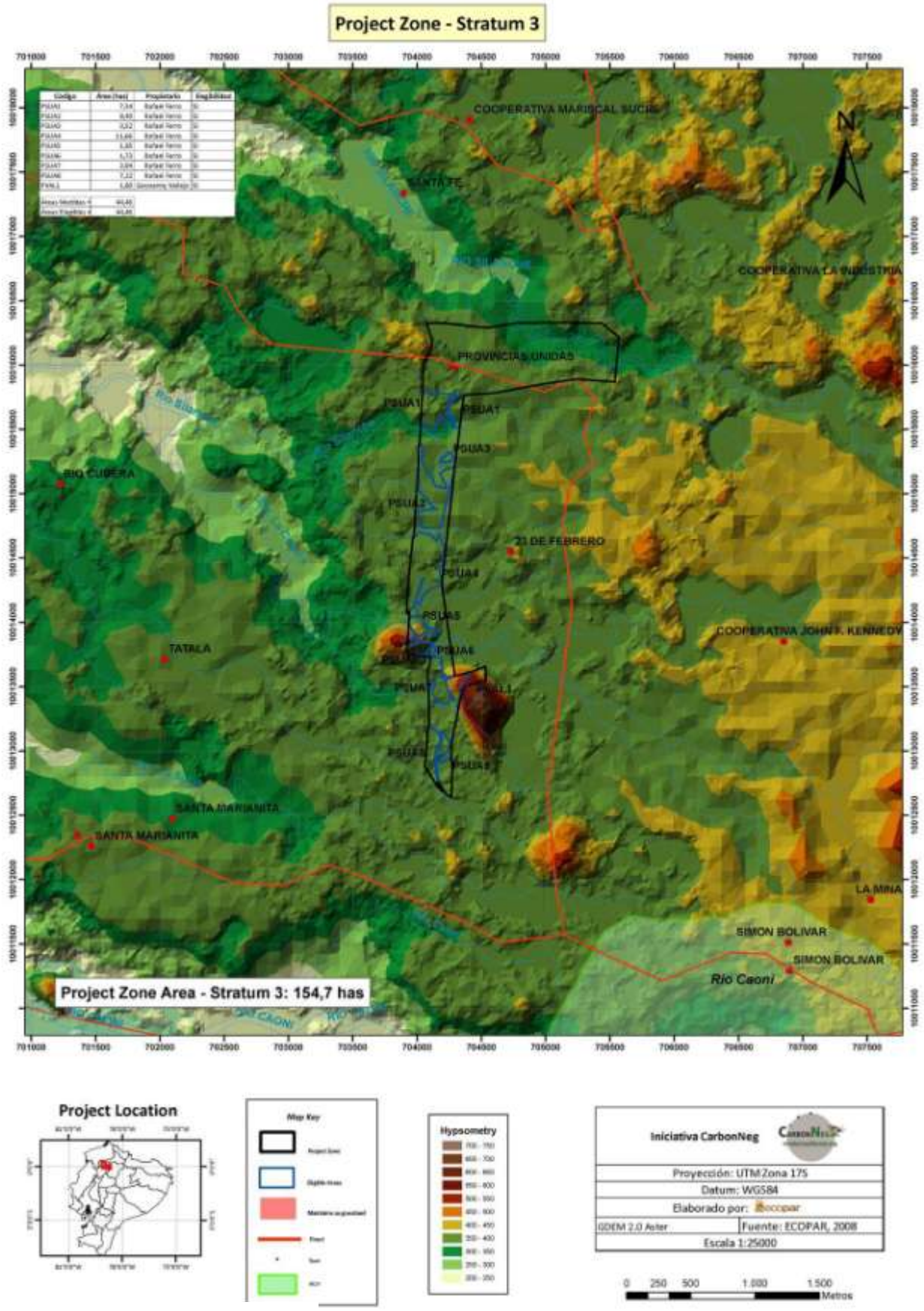
Map 4: project location in Imbabura province



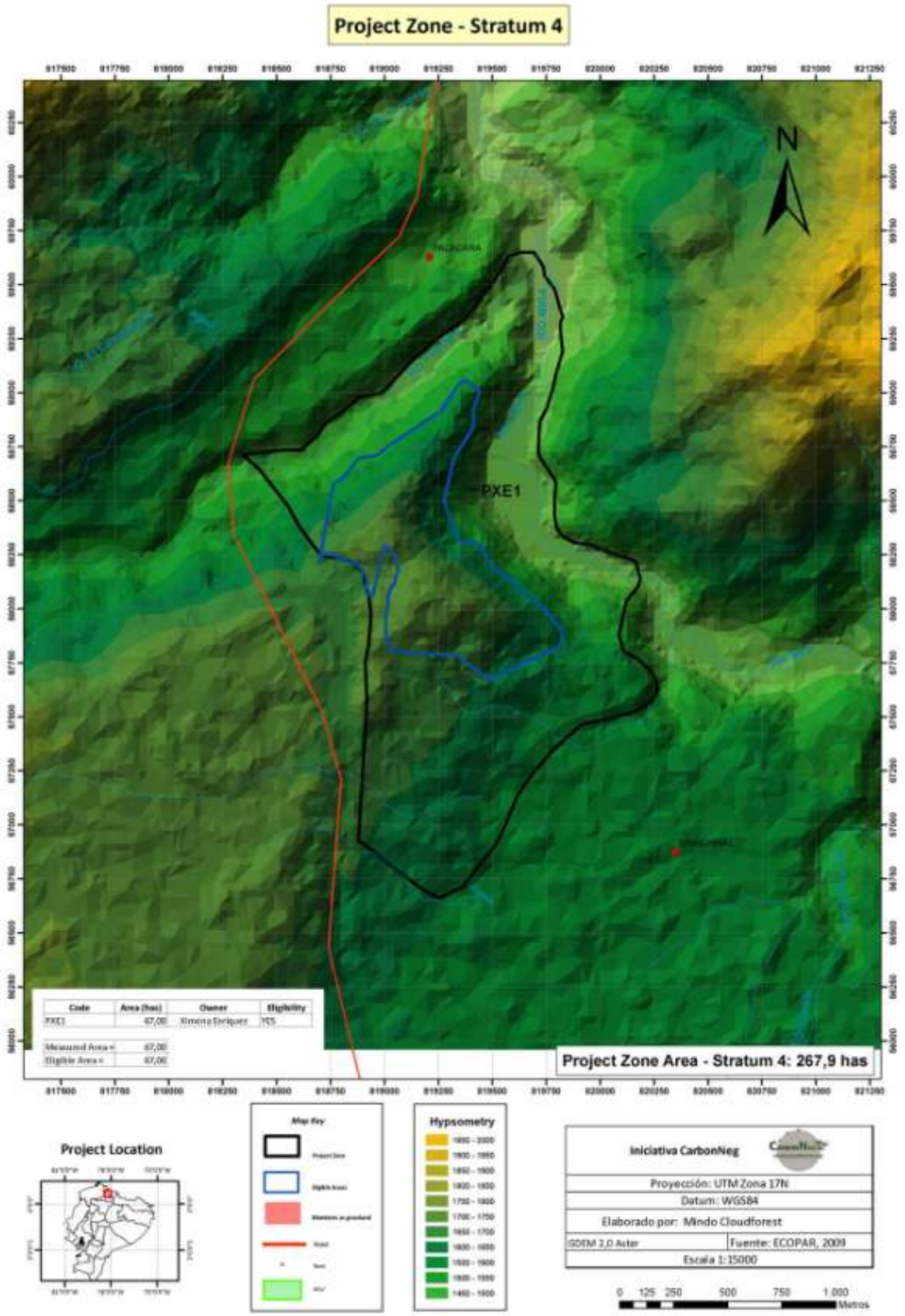
Map 5: Project zone (stratum 1)



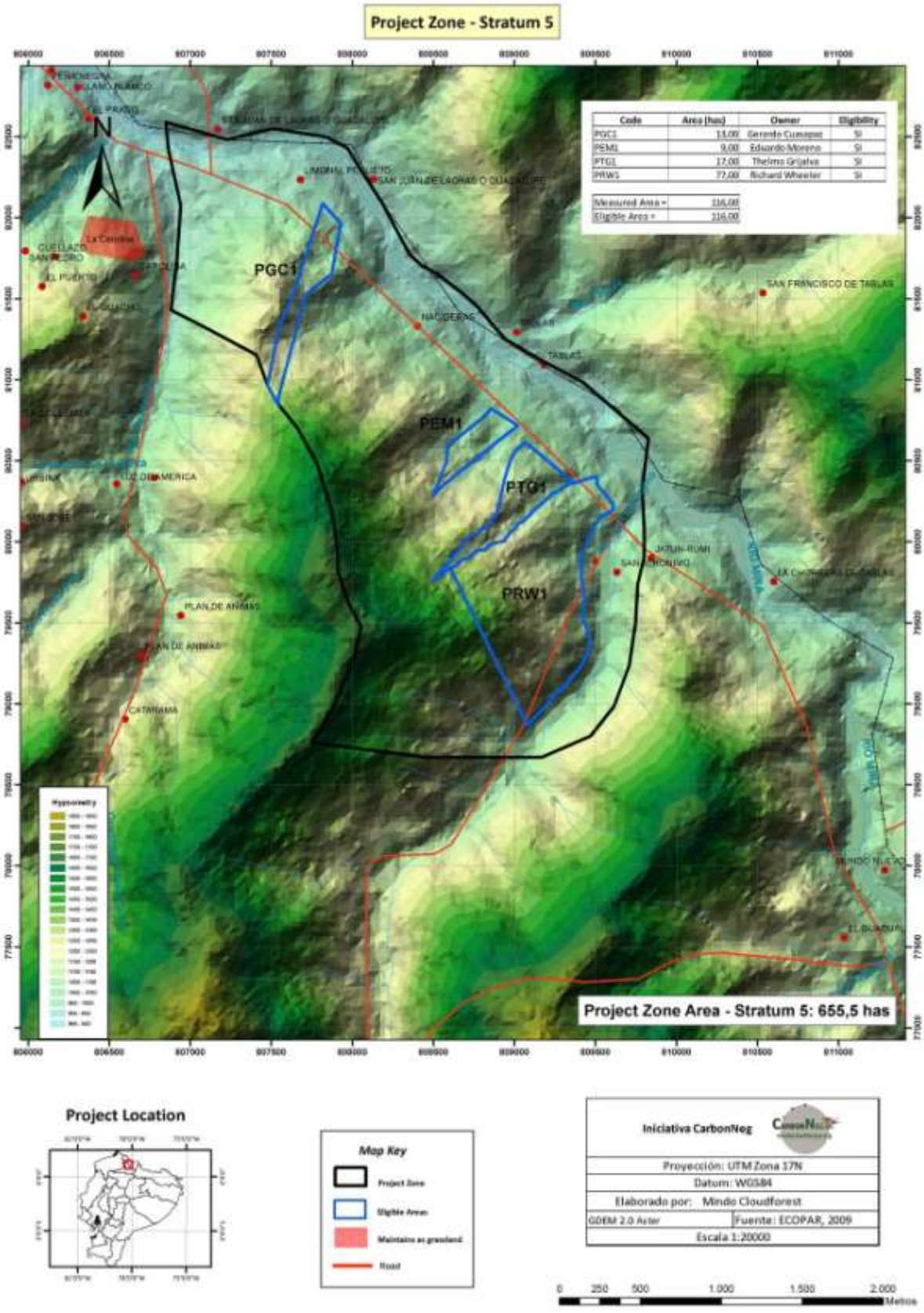
Map 6: Project zone (stratum 2)



Map 7: Project zone (stratum 3)



Map 8: Project zone (stratum 4)



Map 9: Project zone (stratum 5)

1.10 Conditions Prior to Project Initiation

1.10.1 Pichincha Province, Cantons Quito, San Miguel de Los Bancos and Pedro Vicente Maldonado

General information

Picture 2

Project strata 1, 2, 3 are made up of 30+ year old grasslands near to areas of eco-tourism development and will constitute buffer habitat to Protected Forests and private forest reserves. The three strata follow an altitudinal transect between 2300 meters and 350 meters, ranging from montane cloud forest to coastal foothills evergreen forest.

Clearing of these lands by early colonists was exacerbated by the Ecuadorian Agrarian Reform Laws of the late 1960s which required the deforestation "improvement" of 50% of a given parcel for the reception of land title. Since forest clearing soils have lost their original fertility and in many cases are now compacted and eroded due to grazing pressure and the effects of the non-native grasses planted on them, principally 'Pasto Miel' (*Setaria sphacelata*), above 900 meters altitude and *Panicum maximun Jacq*, called 'Saboya', in the lower foothills. Picture 2 shows a patch of 'Kikuyo' (*Pennisetum clandestinum*) found in limited amounts in stratum 1.

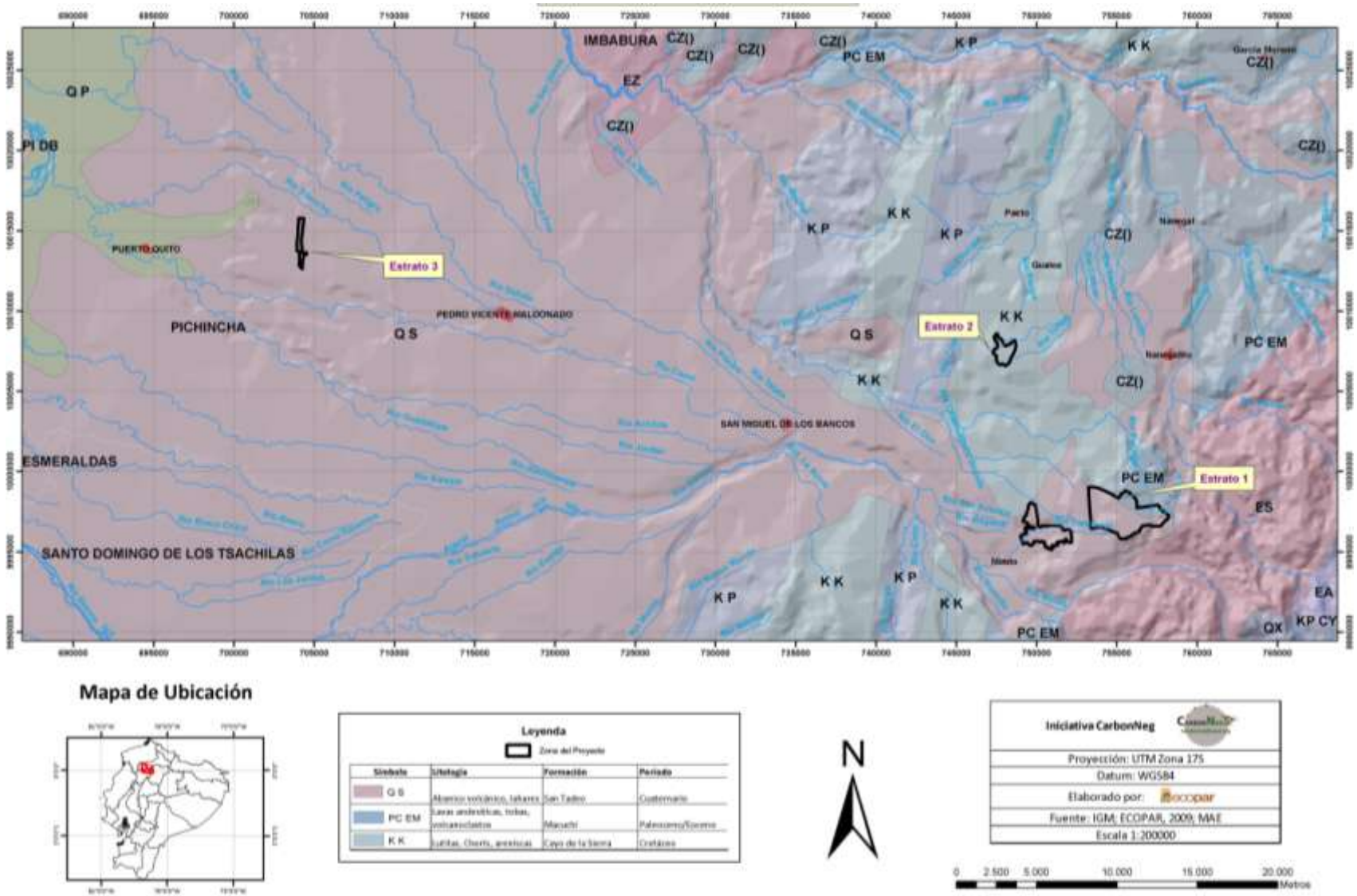
Project strata 1-3 are all adjacent to native forest remnants and their specific project areas have been selected following landowner wishes and zoning of their properties.

Project strata in this area are characterized by high average annual rainfall (2000-4000 mm), extreme topographical relief and shallow top-soils, and are not sustainable for long-term cattle ranching. As in the Picture 2 taken at project participant Grecia Flores´ property, each of these farms do have select flat areas where soils and grasses remain in decent condition, however the majority of these lands are steep and more akin to Picture 3 also taken at Grecia Flores and Roberto Nicolalde´s property.

Picture 3

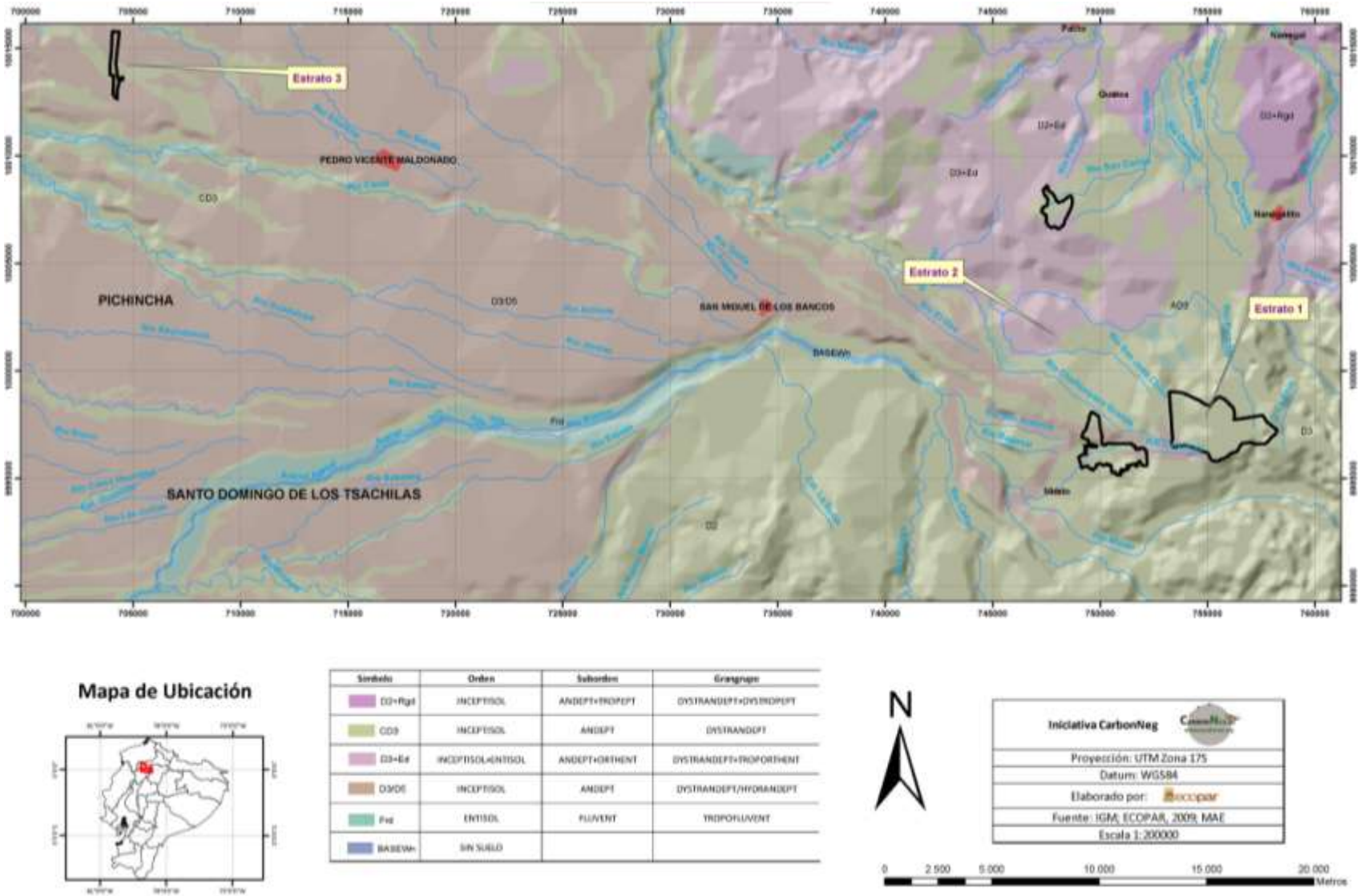
Following this general description of the 3 strata in Pichincha there are a series of maps with information on the geological formations, soil types and erosion potential found in the region. More specific climate, community and botanical information then follows by stratum.

Geology Pichincha



Map 10: Geology in project zone (Pichincha)

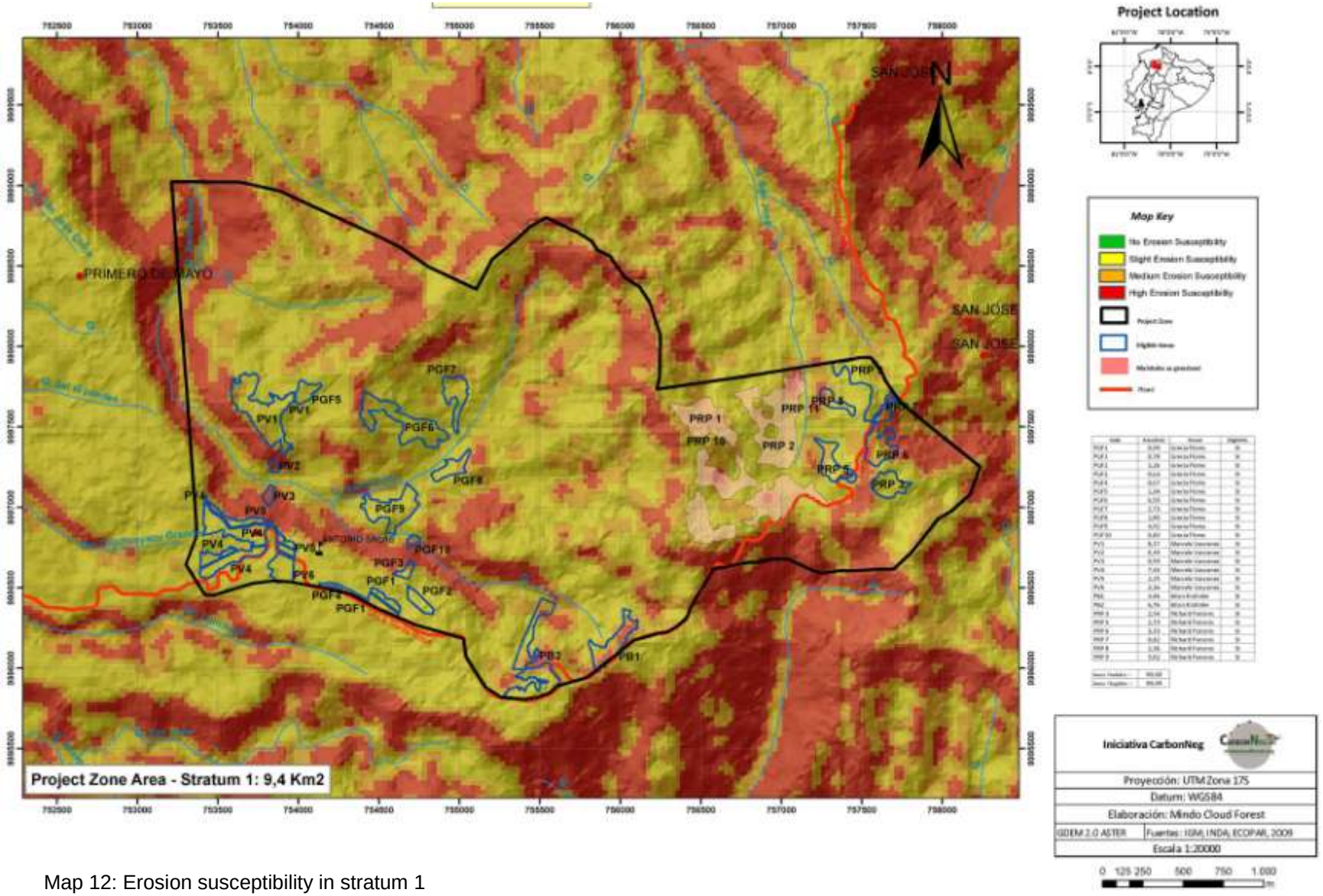
Soils Pichincha



Símbolo	Orden	Suborden	Grangrupo
D2+Rg4	INCEPTISOL	ANDEPT+TROPEPT	DYSTRANDEPT+DYSTROPEPT
CD3	INCEPTISOL	ANDEPT	DYSTRANDEPT
D3+Ed	INCEPTISOL+ENTISOL	ANDEPT+ORTHENT	DYSTRANDEPT+TROPORTHENT
D3/D5	INCEPTISOL	ANDEPT	DYSTRANDEPT/HYDRANDEPT
Fld	ENTISOL	FLUVENT	TROPOFLUVENT
BASEVA	SIN SUELO		

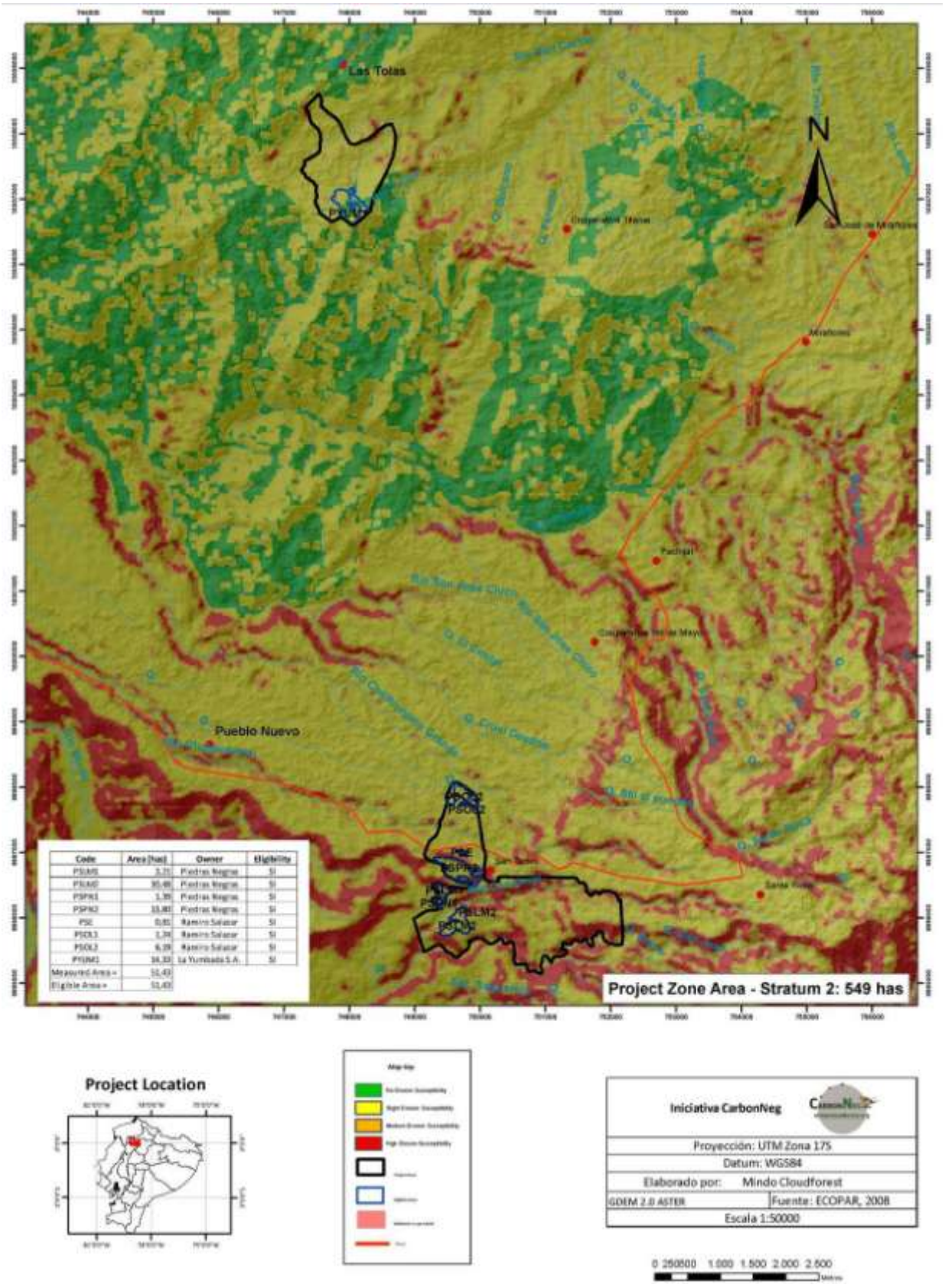
Map 11: Soils in project zone (Pichincha)

Erosion Susceptibility Stratum 1



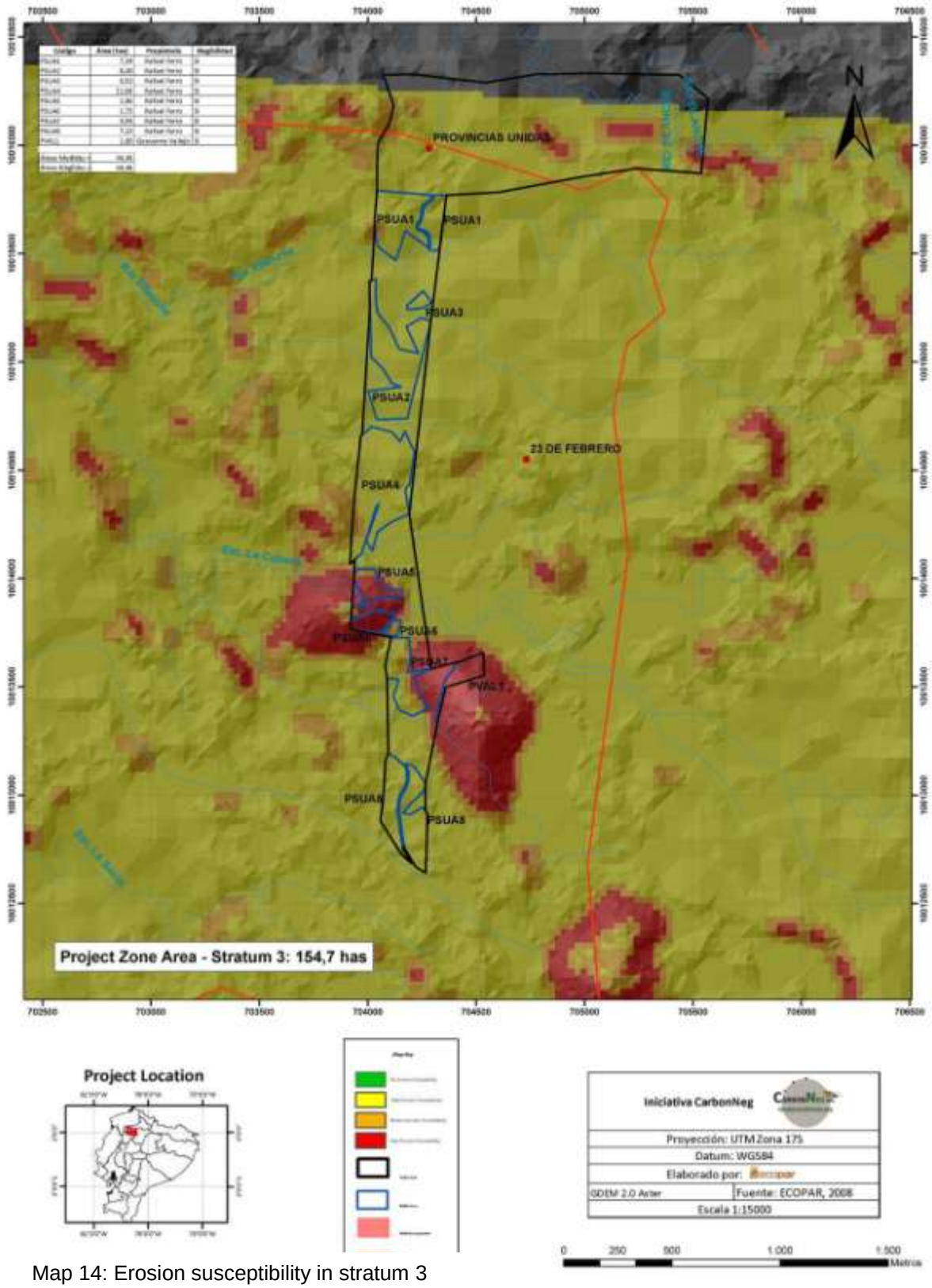
Map 12: Erosion susceptibility in stratum 1

Erosion Susceptibility Stratum 2



Map 13: Erosion susceptibility in stratum 2

Erosion Susceptibility Stratum 3



Map 14: Erosion susceptibility in stratum 3

Community Strata 1-3[16]

Except for the impacts expected on the communities described in general in 1.1, more specifically per stratum we describe the relation with the community and foreseen impacts.

Table 4: Relation between strata 1-3 with community and expected impacts

Stratum	Relevant Community	Relation Community/Project	Impacts Foreseen
1	Santa Rosa de Mindo	There are 4 haciendas within the project zone bordered by one edge of the Mindo-Nambillo Protected Forest and Santa Rosa consisting only of one public school that is closing as of 22/05/2012 due to lack of students.[17] Local residents all live on the neighboring farms, and Santa Rosa as such, is now abandoned.	The land use change caused by the project will affect the work responsibilities of various farm employees, but it is not foreseen that it will change their number.
2 (Y de Mindo)	N/A	The project boundary is isolated from local settlements other than worker housing.	
2 (La Yumbada)	Barrio Las Tolas	Project reforests the top of the watershed that provides village water. Community work "minga" helps plant project trees, 21-05-2012.	More secure drinking water supply, and increased awareness of climate change.
3	Provincias Unidas and 23 de Febrero	Relationship between neighbors from very different backgrounds with different interests. In public meetings all agree that each individual has the right to do what they want in their private lands. However, this respect is not necessarily reflected by daily experience. Prior to Project the land-owner rented grazing rights on his pasture and that relationship has now ended.	Increased water flow for downstream neighbors. Shade from forest perceived as threat to adjacent pastures at property lines. Increased presence of snakes and other perceived threats.

The project activities are located in northwestern Pichincha province an area comprised of three cantons and the rural parishes of the Quito Metropolitan District. In particular project strata 1 and 2 are located in Mindo parish of canton San Miguel de Los Bancos, except for Richard Parsons´ property just over the canton line into Nanegalito parish of the Quito Metropolitan District (DMQ). And also the La Yumbada property is located in Gualea parish of the DMQ. Project stratum 3, the Rancho Suamox has the odd distinction of being in two different cantons with the half nearer the highway belonging to Pedro Vicente Maldonado and the other half in Puerto Quito.

[16] See references, photographs and other evidence in Documentacion_Consulta_Comunitaria_CarbonNeg.docx found in folder "Other Reference Materials".
[17] Conversation between Project director and teacher Licenciada Anita Bravo in front of the Escuela Fiscal Antonio Salas 22/05/2012

The total population of the region is roughly 60,000 with the vast majority being self-described as white-mestizo or of mixed racial origin (88%). Afro-ecuadorians comprise roughly 8% of the population and the indigenous population is quite small, making up only part of the remaining 4% in the region and none within the project zone. There is also a considerable foreign immigrant population of various origins with three such persons participating in the project: Richard Parsons, England; Brian Krohnke, USA and Rafael Ferro, Colombia.

The project activity, tree planting, is carried out 100% on private lands; no communal lands exist within the project zone.

Pichincha taken as a whole has the highest development index of Ecuador, however poverty is still quite common as this continues to be one of the poorest countries in South America. In fact in rural Pichincha, poverty measured as a function of unsatisfied basic needs is still unfortunately the majority condition and highest in the cantons where the project deploys its activities:

Table 5: Poverty incidence in project zone (Pichincha)

Incidencia Pobreza Por Necesidades Básicas Insatisfechas por cantones

CANTON	INDICE DE POBREZA		
	Urbana	Rural	Total
Quito	28.1	51.0	33.6
Cayambe	46.3	88.4	70.0
Mejía	24.8	61.3	54.0
Pedro Moncayo	43.7	83.8	74.3
Rumiñahui	25.8	56.7	30.1
San Miguel de los Bancos	54.3	83.1	74.9
Pedro Vicente Maldonado	64.7	90.2	80.2
Puerto Quito	51.1	94.1	88.4

The main economic activities of northwest Pichincha are raising livestock and subsistence agriculture for family consumption, especially amongst original colonist families who began arriving in the 1960s as a result of different government agricultural reforms and homesteading acts. However, since the mid-1980s and accelerating in the last decade there has been more and more investment and development of eco-tourism and different niches within the general category: birding or avitourism and adventure tourism.[18] The declaration of South America's first Important Bird Area, in Mindo, was just one of many drivers for this phenomenon, and it again highlights the primordial role the spectacular avian diversity plays in the region. All project participants fit into this second, newer group of landowners with tourism and conservation interests taking precedence over agricultural interests.

Another, important phenomenon in the project region but not directly in the project zone has been the marked development of mono-crop agriculture especially of African oil palm and heart of palm

[18] All project participants fit into this last, tourism-oriented subset and/or otherwise obtain their income from non-farm sources.

"palmito" in the tropical parts of the regions, cantons Pedro Vicente Maldonado and Puerto Quito especially. [19,20,21] These intensive and potentially high-negative impact crops usually involve investors and capital from without the project region, much as in the case of ecotourism.

The without-project scenario assumes the local people (communities) would primarily keep on keeping livestock, managing pastures, extending grasslands into remaining patches of natural vegetation, putting pressure on land resources (natural vegetation) and ecosystem services: water, biodiversity and carbon retention, without bettering their living perspectives in the near nor further future. Project participants all are actively grazing their land or renting pasture rights as a means to sustain their land. Without the project they would continue to do so as the economic barriers to reforestation are quite real as established in section **2.5 Additionality**.

Biodiversity Strata 1-3

Birds

The project zone in these strata provides habitat to 12 IUCN Red List Vulnerable and 3 IUCN Red List Endangered bird species. See Annex 2 for a species list that includes these High Conservation Values and 58 other endemic bird species

As summarized in section 1.1 of this PDD, this region holds extraordinary avian diversity, and the project activity will take place in and around Important Bird Areas that meet objective criteria established by Birdlife International. As a rough baseline, current lists of bird species found on project lands vary radically from the strata located in the Mira watershed with +/- 50 species, and the geographically similar areas with more intact forests near the Pachijal which have over 250 species (Pers. Com. Paul Greenfield, published bird lists and field observations).

Bird lists of the 500+ species found in the project region can be downloaded at www.mindocloudforest.org. Remarkably enough, these lists were compiled from sightings at only two properties in the area, the Milpe and Río Silanche Bird Santuaries owned by MCF. Of particular conservation relevance it can be mentioned that these lists contain: 72 endemic; 12 vulnerable; and 3 endangered species as categorized by Birdlife International and the IUCN. This impressive avifauna is but one example of the extremely high biodiversity found in the project area, and more reference material is available on the vascular plants, insects and other biota. Project proponent has chosen to focus on the well known and representative avifauna as an indicator of the area's overall biological wealth. Different suites of bird species and their frequency in different areas serve as indicators of a habitat's relative well-being. Surveys of bird biodiversity prove to be particularly valuable: apart from their high intrinsic value and their value as essential ecosystem service providers, birds in forest habitats are extremely sensitive to forest loss and forest degradation and are therefore potential useful indicators for the impact of habitat and

[19] Línea Base Sociocultural de las Actividades Agropecuarias en el Área del Corredor de Conectividad Tropi-Andino-Pichincha, Fundación EcoFondo, 2012. Summarizing information from the Sistema Integrados de Indicadores Sociales del Ecuador, 2010. www.siise.gob.ec
[20] Evolución-y-Situación-de-la-Pobreza-en-Ecuador-Dic-2010-pp.pdf
[21] INEC_pobreza_2012.pdf

climate disturbances on biodiversity and environmental health (Aerts, R. et al.).[22] Most of the globally identified Key Biodiversity Areas, sites of importance for different species according to internationally agreed criteria, are Important Bird Areas (IBAs) [23,24], key sites for conservation of threatened, restricted range and/or migratory or congregatory bird species. The regions of strata 1 and 2 are confirmed to have conservation importance to taxa other than birds, and project grounds are located in High Conservation Priority Areas.[25]

Following from project aim to create, recreate, strengthen and protect bird habitats, both in Pichincha and Imbabura, project will plant a total of more than 45 native species, with the aim always to maximize diversity. In section 1.8 Project Description this is treated again in more detail by stratum and in General Forest Management Plan in digital supporting materials.

The project monitoring plan described in chapter 4 will quantify bird species present in the project boundary over time and contribute to scientific understanding of the relation between bird populations and habitat quality. Annex 2 contains a list of the birds of particular conservation relevance. Cooperation with research groups of universities in Belgium (Ghent University) and Ecuador is planned to monitor other species groups (especially invertebrates that react much faster to changes than birds) as well to get a more complete picture of biodiversity gains of this project. While specific baseline studies for each new target species or group of species have yet to be performed, large amounts of similar land in the project zone will remain to provide baseline information in future.

[22] Aerts, Raf, Spranghers, Sarah, Verbist, Bruno, Lens, Luc, and Sekercioglu, Cagan. 2011. Bird surveys for REDD+: avian communities indicate forest degradation in a Peruvian coffee landscape. Available from Nature Precedings <http://dx.doi.org/10.1038/npre.2011.6589.1>

[23] Eken, G., Bennun, L., Brooks, T.M., Darwall, W., Fishpool, L.D.C., Foster, M., Knox, D., Langhammer, P., Matiku, P., Radford, E., Salaman, P., Sechrest, W., Smith, M.L., Spector, S., Tordoff, A. 2004. Key biodiversity areas as site conservation targets. *Bioscience* 54, 1110-1118.

[24] Langhammer, P.F., Bakarr, M.I., Bennun, L., Brooks, T.M., Clay, R.P., Darwall, W., De Silva, N., Edgar, G.J., Eken, G., Fishpool, L.D.C., da Fonseca, G.A.B., Foster, M.N., Knox, D.H., Matiku, P., Redford, E.A., Rodrigues, A.S.L., Salaman, P., Sechrest, W., Tordoff, A.W. 2007. Identification and Gap Analysis of Key Biodiversity Areas: Targets for Comprehensive Protected Area Systems (Best Practice Protected Area Guidelines). IUCN, Gland, Switzerland.

[25] Please see Table_HCV.xlsx in folder “Other Reference Materials” for a breakdown by strata.

Picture 4

The great avian wealth and generally high biodiversity of this area of Pichincha does not mean that there are not also environmental problems such as the expansion of the agricultural frontier and fracturing of forest corridors. As shown in multi-temporal maps in section 2.3 Project Boundary, the project zone is generally characterized by the consolidation of grasslands in some areas and forest re-growth in others. However, it must be kept in mind that the current colonization of the area has occurred in only the last 50 years, and has accelerated greatly since the completion of the paved Calacalí-La Independencia highway in the 1980s. While the avifauna populations are still relatively healthy and investment in tourism and conservation is growing, so is anthropogenic pressure on all natural resources. More worrisome even still, the Ecuadorian government has recently announced the creation and sale of new mining concessions in the region, and it is simple common sense to realize that new large scale mining can only have negative impacts on bird populations and forest integrity.[27]

Other taxa

Certainly other taxa of interest exist in the project zone of the three strata in Pichincha, and an annotated list of 62 mammal species found in strata 1-2 is on pages 122-124 of the "Plan de Manejo BVPTST - 22 dic 09.pdf" in the folder "Other Reference Materials". Also in the sub-folder "Lists Fauna Project Strata" of "Other Reference Materials" we present "Fauna Suamox Estrato 3.xls" prepared by project participant Rafael Ferro with professional help.

Vegetation

[26] Picture 5 of the endemic and extremely odd Club-winged Manakin (*Machaeropterus deliciosus*) taken by Nick Athanas in 2009 at the Milpe Bird Sanctuary, HQ of Mindo Cloudforest Foundation. In a fortuitous example of sexual-selection driven convergent evolution, this bird slaps and rubs its wings together to chirp like a cricket!

[27] http://www.elcomercio.com/negocios/contratos-mineros-agosto_0_521348014.html#

In the Pichincha portion of the project we find essentially three forest types: Montane cloud forest, Pre-montane evergreen forest and Coastal foothills evergreen forest and these are described as following in descending altitudinal order and also in agreement with project strata 1-3 and according to the system of Holdridge[28] adapted to Ecuador by Cañadas[29].


Picture 5

Details per stratumStratum 1: Montane cloud forest
Altitude: 1800 – 3000 meters; average rainfall above 2000 mm; average temperature 15-17 °C[30]; Canopy height between 20-25 meters; No drought occurrence although some years can be considerably drier than others; No flood occurrence due to pronounced topography of area; No frost occurrence; Damaging winds occasional during storms but no tornados or hurricanes. Soils in this stratum originate from volcanic fans and mud flows of volcanic ash (lahares) from the Quatenary period. They are classified as Inceptisol/Andept/Dystrandept and Hydrandept (see map 11). Almost all, except some very small, project terrains have a low to medium erosion susceptibility (see map 12), and the project activity of reforestation will only lower this.[31] The forests of Santa Rosa de Mindo, our stratum 1 are the best places in the world to find the rare and IUCN Red List Vulnerable Tanager Finch (*Oreothraupis arremonops* in Picture 5). Trees are covered with abundant epiphytic mosses, orchids, bromeliads and ferns. Bamboo species are also numerous.

Characteristic flora include: *Bomarea* spp. (Amaryllidaceae): *Anthurium mindense*, A. *gualeanum*, A. *nanegalense*, A. *clorugatum* and A. sp. (Araceae); *Blechnum monomorphum* (Blechnaceae); *Begonia* sp. (Begoniaceae); *Agnus acuminata* (Betulaceae); *Brunelia tomentosa* and B. sp. (Brunelliaceae); *Cecropia maxima* (Cecropiaceae) *Weinmania pinnata* (Cunoniaceae); *Cyathea caracasana* (Cyatheaceae); *Dennstaedtia tryoniana* (Dennstaedtiaceae); *Escallonia paniculada* (Escalloniaceae); *Gunnera brepoghea* and G. colombiana (Gunneraceae); *Boconia integrifolia* (Papaveraceae); *Piper carpunya*, P. *sodiro*i and P.sp., *Peperomia* sp. (Piperaceae). *Palicourea* sp. (Rubiaceae); *Nectandra* sp. (Lauraceae); *Miconia corazonica*, M. *creocea*, M. *theazans* and M.sp., *Brachyotum ledifolium* (Melastomataceae); *Cedrela montana* (Meliaceae); *Siparuna guajalitensis* and S. sp. (Monimiaceae); *Myrcianthes allí* and M. sp. (Myrtaceae) *Fuchsia pilalensis* and F.sp. (Onagraceae); numerous species of *Orchidaceae*; *Pasiflora mixta*, P. *alnifolia* and P. coactilis (Passifloraceae); *Chasquea scandens* y Ch.sp. (Poaceae); *Elaegia utilis* (Rubiaceae); *Freziera verrucosa* and *F*.sp. (Theaceae); *Aegiphila* sp. (Verbenaceae). More info

[28] Holdridge, L.R (1967) Life Zone Ecology.Tropical Science Center, Costa Rica
[29] Cañadas Cruz, L. (1983) Mapa bioclimático y ecológico del Ecuador. Quito; Banco Central del Ecuador.
[30] Plan de Manejo del Bosque Protector Tandayapa-San Tadeo p. 17
[31] Mapa general de suelos del Ecuador, Sociedad Ecuatoriana de la Ciencia del Suelo, 1986. Also, Project soil maps prepared by Ecopar.

on plant species in this stratum can be found here;
http://plantasdemindo.blogspot.com/2011/03/lista-de-especies-familias.html

Stratum 2: Pre-montane evergreen forest

Altitude: 1300 - 1800 meters; Canopy height between 20-25 meters; average rainfall above 2000 millimeters; average temperature 17-18 °C; No drought occurrence although some years can be considerably drier than others; No flood occurrence due to pronounced topography of area; No frost occurrence; Damaging winds occasional during storms but no tornados or hurricanes. Soils in this stratum originate from shales (lutitas), silex (cherts) and sandstones (areniscas) from the Cretacious period. They are classified as Inceptisol/Andept/Dystrandept and Hydrandept (see map 11). Project terrains have a zero or low erosion susceptibility (map 13).

Picture 6

The Sachatamia property of Ramiro Salazar has a lek of the Long-wattled Umbrellabird (*Cephalopterus penduliger*), also an IUCN Red List Vulnerable species.

As compared to the coastal lowlands, woody vines diminish both in number of species and individuals while epiphytic plant life becomes more abundant. Characteristic flora: Anthurium ovatifolium, A.sp. (Araceae); Cerowylon alpinum, Socratea exhorriza (Arecaceae); Buddleja americana (Budlejaceae); Cecropia bullata, C. monostachya and C .sp. (Cecropiaceae); Cyathea sp. (Cyatheaceae); Heliconia sp. (Heliconiaceae); Nectandra menbranacea (Lauráceas); Carapa guianensis (Meliaceae); Siparuna guajalitensis, S.eggersii, S.laurifolia S.sp. (Monimiaceae); Fucsia macrostigma (Onagraceae); Piper sp. (Piperaceae); hemi-epiphytic species of Picus sp. (Moraceae).

Stratum 3: Coastal foothills evergreen forest

Altitude: 300 - 1300 meters; Canopy height 30 or more meters; average rainfall greater than 2000 millimeters; average temperature 25 °C[32]; No drought occurrence although some years can be considerably drier than others; No flood occurrence due to pronounced topography of area; No frost occurrence; Damaging winds occasional during storms but no tornados or hurricanes. Soils in this stratum originate from volcanic fans and mud flows of volcanic ash (lahares) from the Quatenary period. They are classified as Inceptisol/Andept/Dystrandept and Hydrandept (see map 11). The northern project terrains have a zero or low erosion susceptibility, while some terrains in the south are highly susceptible (see map 14), and reforestation will only lower this.

Picture 7

The Chocó endemic Guayaquil Woodpecker (Campephilus guayaquilensis) taken by Sam Woods near Rafael Ferro´s Rancho Suamox.

Arboreal species predominate, especially palms, and herbaceous coverage is dense. Orchids, ferns, bromeliads and aroids are common on tree trunks. Characteristic flora: Palms: Wettinia quinaria, Pholidostachys dactyloides, Iriartea deltoidea (Arecaceae); Virola dixonii, Otoba gordoniifolia (Myristicaceae); Guarea cartaguenya (Meliaceae), Protium ocidentalis (Burseraceae); Vitex gigantea (Verbenaceae); Caryodaphnopsis theobromifolia (Lauraceae); Swartzia haughtii (Fabaceae). Among herbaceous species: Irbachia alata (Gentianaceae); Begonia glabra (Begoniaceae) and Costus lavéis (Costaceae).

Stratum 3 deserves special mention in regard to project biodiversity claims to meet optional standard GL3 of the CCB standards. Rancho Suamox and Mindo Cloudforest Foundation's Rio Silanche Bird Sanctuary are neighbors and with the reforestation of Rancho Suamox the two properties will nearly create a forest corridor between the Caoní and Silanche Rivers, all within the Birdlife International designated Rio Caoní Important Bird Area (IBA EC040). Project developer together with the owners of Rancho Suamox and Puerto Quito Municipal Councilman Edwin Bustamante, have created a project profile to complete and protect this future forest corridor, and have begun efforts to find funding for implementing this project. Project profile is located in **Annex 3** to current document.

[32] Caracterización Cantonal y Parroquial, Gobierno Provincial de Pichincha pdf p. 166 and Estudio Exploratorio: "Problemática y Conflictos sobre los Recursos Hídricos por efectos del cambio Climático" (Senagua_capt-2_eje recursos hdricos.pdf p. 2.7)

1.10.2 Imbabura Province, Canton Ibarra, San Géronimo y Salinas: Strata 4-5

General Information

The project area covers a transitional zone running from Salinas parish in the inter-Andean valley at ca. 1750 meters altitude to La Carolina parish on the sub-tropical western slopes of the Andes around 900 meters and is made up of two strata, one in each parish.

Picture 8

In Salinas there has been intensive agriculture and deforestation especially since the 1950s while in La Carolina early deforestation was accelerated and compounded after greater homesteading following the Ecuadorian Agrarian Reform Laws of the late 1960s (as in Pichincha). Especially around the settlement San Gerónimo in La Carolina parish, deforestation has been extreme or near complete with pioneering balsa trees or the occasional palm being some of the only things standing, demonstrated clearly in picture 8.

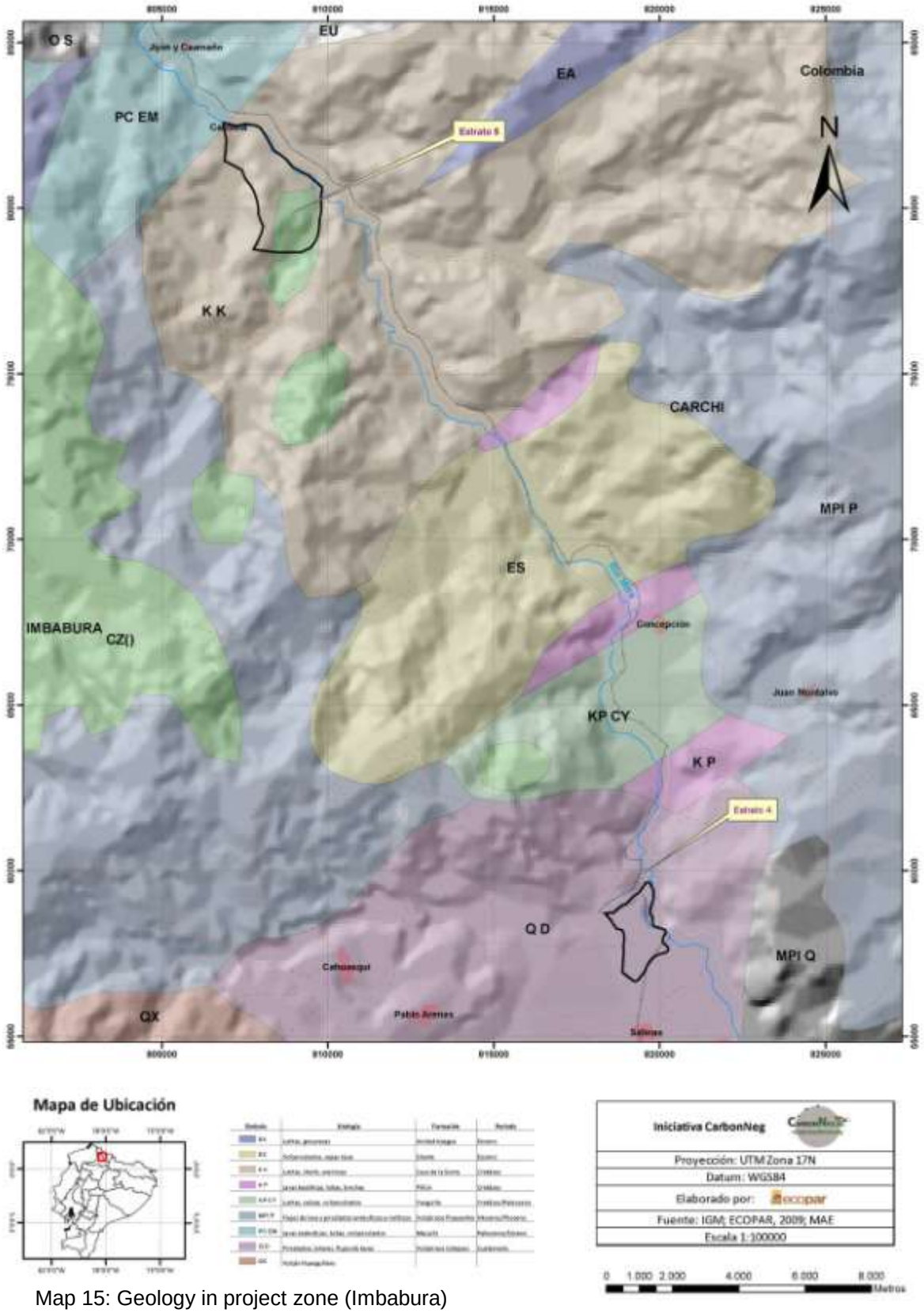
This situation is aggravated by the cultural practice of burning off grasses and scrub to 'improve' soil fertility and to 'call the rains' as is believed by many area residents (Pers. Com. Peter Ramos, school teacher, San Gerónimo, 2009 shown here, and Environmental Plan Canton Ibarra, 2006, Ch. 1.1. see "ambiente.pdf" in folder "Other Reference Materials.")

Picture 9

Salinas, dry pre-montane forest, has average rainfall between (500-1000 mm), and La Carolina parish between dry pre-montane forest and wet tropical forest receives some 1500 mm average rainfall (Cantonal Development Plan Municipality of Ibarra, May 2006 Ch. 1.2).

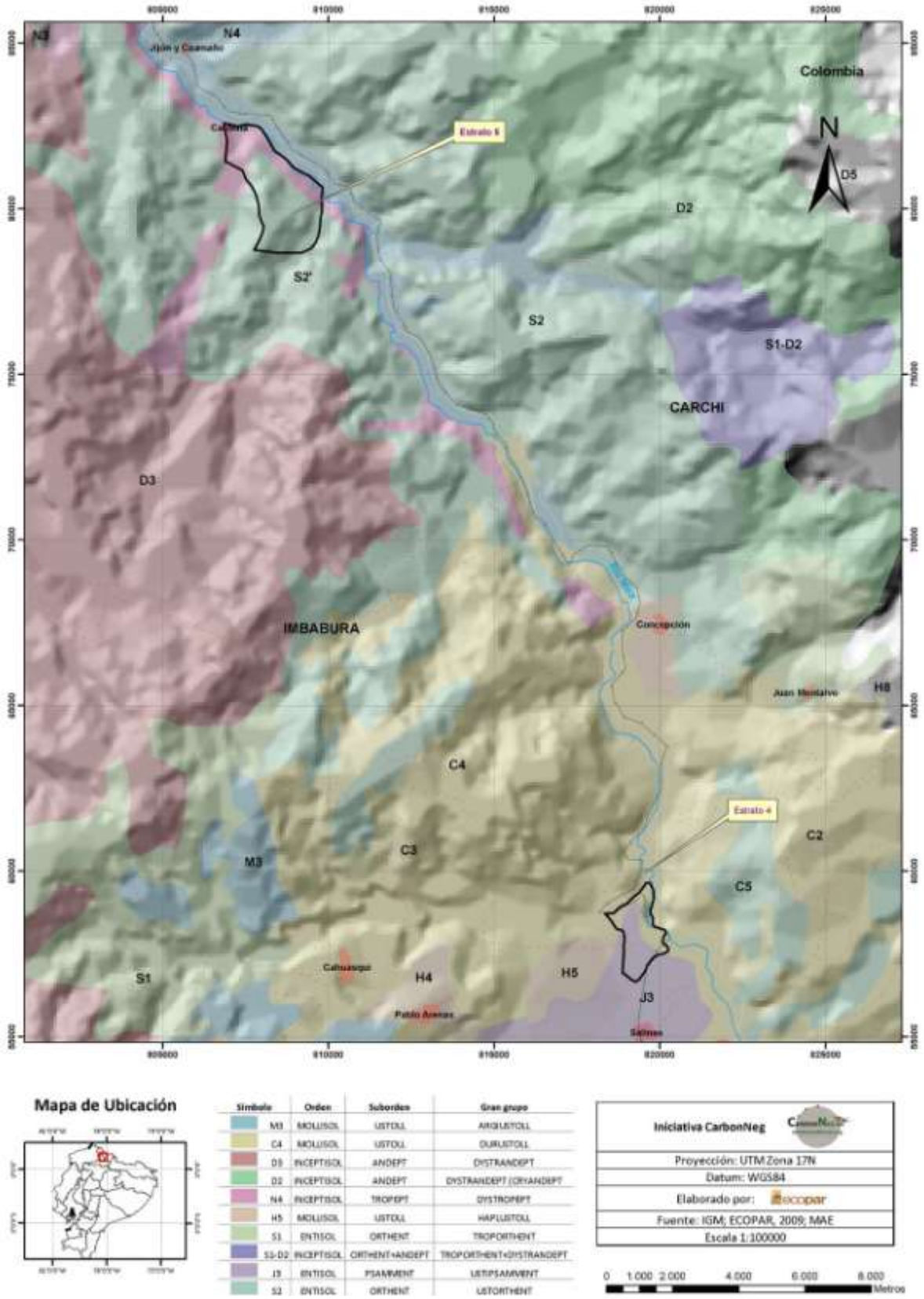
Geology, soils and erosion susceptibility maps for the region are found on the coming pages then more specific Climate, Community and Biodiversity is presented for the two strata in Imbabura province.

Geology Imbabura



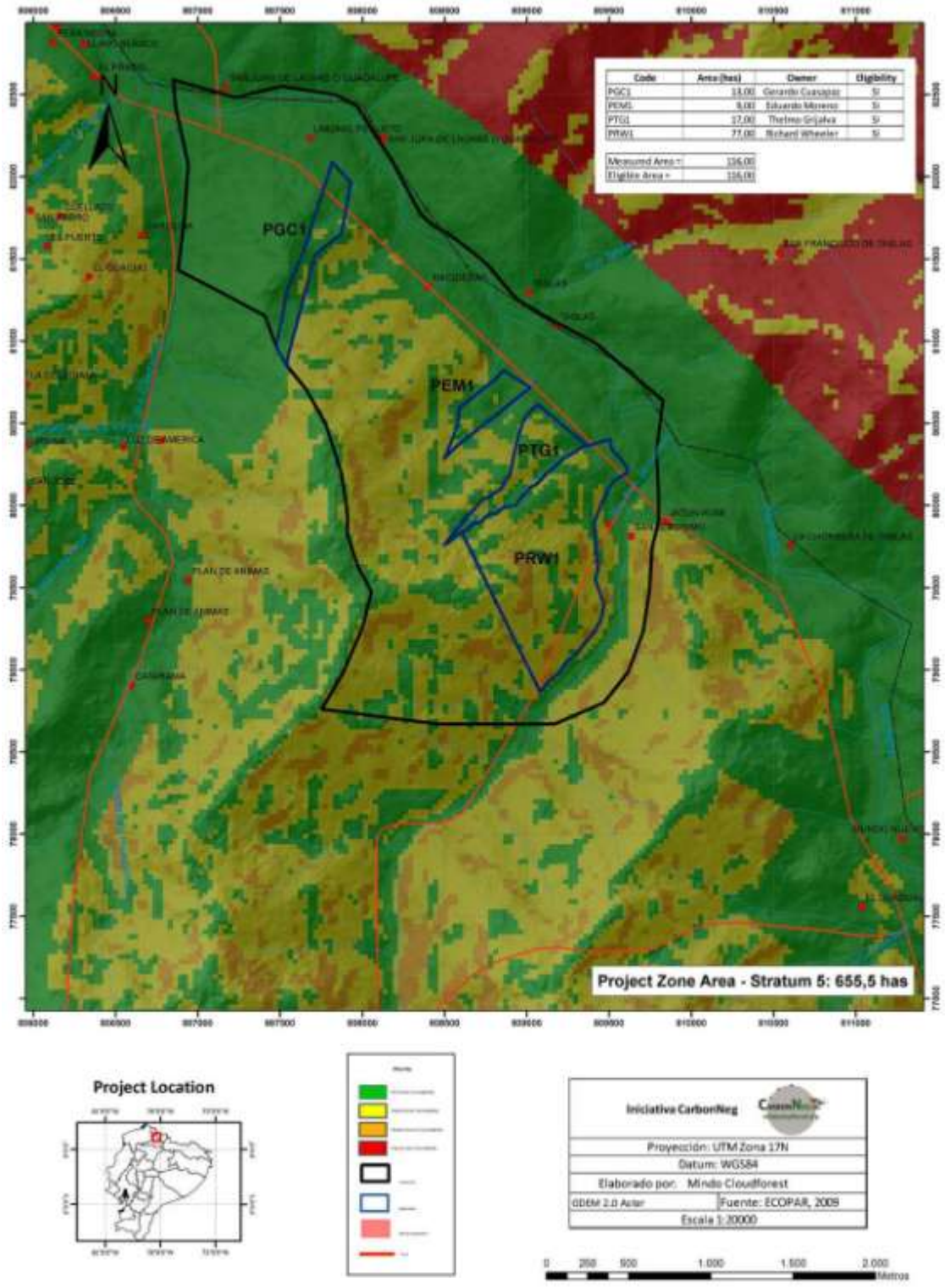
Map 15: Geology in project zone (Imbabura)

Soils Imbabura



Map 16: Soils in project zone (Imbabura)

Erosion Susceptibility San Gerónimo: Stratum 5[33]



Map 17: Erosion susceptibility in project zone

[33] Project zone 4 was not mapped for its Erosion susceptibility, however it in the semi-arid higher reaches of the Mira Watershed, an area listed as susceptible to drought and desertification on p.87, PROGRAMA DE ACCIÓN NACIONAL DE LUCHA CONTRA LA DESERTIFICACIÓN Y MITIGACIÓN DE LA SEQUÍA QUITO, AGOSTO DEL 2004, Ministry of Environment, Ecuador.

Community Impacts

Except for the impacts expected on the communities described in general in 1.1, more specifically per stratum we describe the relation with the community and foreseen impacts.

Table 6: Relation between strata 4-5 with community and expected impacts

Stratum	Relevant Community	Relation Community / Project	Expected Impacts
4	N/A	The Project Boundary is isolated from the community found in Salinas parish, and as such the project zone does not include this community. Project donates saplings to parish for community use.	In conversations with Raúl Maldonado, President of the Salinas Parish Board (Junta Parroquial) he has expressed his gratitude that the project will improve the scenery to some small degree and that it sets a good example.
5	San Gerónimo	During implementation phase the project is the single largest employer in the community. Project crew leader is project participant and landowner and also the president of the local farmers association. Community water supply comes from springs in project zone.	Land use change from baseline of near zero productivity to mixed plantations with harvestable fruit trees and eventual timber resources, soil recuperation and increased land values.

Rural parishes northwestern Ibarra canton, strata 4-5: The project activities are located in northwestern Imbabura province in Salinas and La Carolina parishes of canton Ibarra. While the canton (population 181,000) taken as a whole has a relatively high level of development as compared to countrywide averages[34], its rural parishes are well below national averages in many respects.[35] Both Salinas (population 1,741) and La Carolina (population 2,739) have dramatic poverty indexes for unsatisfied needs when compared to Ibarra canton generally:[36]

Table 7: Poverty indexes in project zone (Imbabura)

Area	Extreme Poverty (NBI)	Poverty (NBI)
Ibarra Canton	15.6%	39.8%
Salinas Parish	15.8%	53.2%
La Carolina Parish	57.9%	95.9%

These parishes both have exceptionally high percentages of Afro-Ecuadorians who traditionally are second only to the indigenous, or second-to-last in development terms in the country generally (Afro-Ecuadorians make up roughly 60% of the population in Salinas and 40% in La Carolina).[37]

[34] In 2006 Ibarra was in the top 2 quintiles for every Millennium Development Goals (ODM EN EL ECUADOR.pdf)
[35] http://www.siise.gob.ec/siiseweb/
[36] *Ibid.*
[37] Porcentaje poblacion afro parroquias 2001.pdf

This combination of factors has determined the simple project indicator of jobs created and man/days paid during all phases of project implementation. As learned by PP while registering project workers in the Ecuadorian Social Security Institute, only one employee from a total 28 in the two strata had previously held a formal job with legal benefits and wages. This employee, Martín Maldonado, from Salinas is coincidentally an Afro-Ecuadorian and remains in charge of maintenance and replanting in stratum 4.

The main economic activities of northwest Imbabura are raising livestock and subsistence agriculture for family consumption and sugar cane production both for delivery to the IANCEM sugar mill and for artisanal fabrication of sugars and liquor. While tourism opportunities are present, the perception of risk due to the proximity of the Colombian border has kept some international ecotourism from visiting the zone.[38] Beyond the perception of risk there is some actual risk as demonstrated by the reinforced army outpost in Lita just 20 minutes away from San Gerónimo where there is an integrated immigration and anti-narcotics police control point.

Project will use various native species that will provide economic incentives to project (participants: Guabo (*Inga spectabilis),* Guayaba (*Psidium guajava),* Guarango or Tara (*Caesalpinia spinosa*) and Jaboncillo or Camochicha (*Sapindus saponaria*). Harvest of forest products from these plants will provide tangible economic returns for participants and create demand for local labor. Guabos and guayabas are common throughout the neo-tropics but Tara tannins are less-well known. This product has unmet demand on the international market for dyeing leather and other applications in the wine industry, etc., and local company Puyaburo S.A. has installed the necessary processing machinery in Ibarra, Imbabura. Representatives of Puyaburo S.A. have indicated that as of August, 2009, they had exported one 20 foot shipping container to a client in Europe and that their main barrier to growth is greater supply of raw material. This bean can be harvested without affecting tree growth or otherwise reducing sequestered carbon in project areas. (Pers. Com. Dr. Rodolfo Chacón, 2009-2011 and Ramiro Chacón, 2010). The seeds of the 'Camochicha' have local value for their use in handicrafts.

Project participant Gerardo Cuasapaz is also president of his local farmers´ association, and has also been leading the project's largest work group through our first 6 months. For the 2012-2013 planting season he and his wife Blanca are going to install a temporary and modern nursery at their farm to grow project saplings for project expansion areas in stratum 5 with technical assistance from project.

Picture 10, Gerardo Cuasapaz and wife Blanca Cuasquer.

Picture 11

[38] Estrategia Nacional de Aviturismo, MINTUR, 2006.

The without-project scenario assumes the local people (communities) and participating landowners would primarily keep managing their lands as grasslands, putting pressure on resources (natural vegetation) and ecosystem services: water, biodiversity and carbon retention, without bettering their living perspectives in the near nor further future.

Biodiversity

As stated in section **1.1** this area is part of an altitudinal transect running between three Birdlife International designated Important Bird Areas (IBAs) in Northwestern Ecuador: Awa Ethnic Territory and Surroundings (IBA EC002); Cotacachi – Cayapas Ecological Reserve (IBA EC037); and El Angel – Cerro Golondrinas (IBA EC036). Seen otherwise, this transect follows the Mira river watershed which forms the northwest corner of Ecuador. However, the specific project area has been affected by intense deforestation and depredation of wildlife since the mid 1900s. It is a stated desire of several project participants to once again see on their lands some of the bird and other animal life they remember from their youth.

In total the project's 5 zones provide habitat to 12 IUCN Red List Vulnerable and 3 IUCN Red List Endangered bird species, but none of them are found in the project zone of the Imbabura segment of the project. The bird list for strata 4-5 created during project visits and with the help of Nelson Apolo a guide from Mindo and revision by Paul Greenfield shows just over 50 species, as compared to the 260+ found on the 100 hectare Milpe Bird Sanctuary property, at the same altitude and roughly 80 kilometers south. This +/- 20% representation of the potential avifaunal diversity should be expected to be repeated across other taxa, by simple force of logic and common sense.

For species groups other than birds very limited information is available for the project zone in stratum 4 and 5, and a description of these will be part of the baseline studio for both flora and invertebrate species. More details are described in the monitoring plan (4.3.8). If non-forest related red list species are encountered, adecuate measures will be taken to ensure sufficient habitat is present for them. During the project period, adjacent degraded terrains will be monitored as well to provide a reference for biodiversity recuperation due to project activity.

Empirical evidence suggests that relatively few of the mammal species found at similar altitudes in the Pichincha segment of the project zone are present in the project zone of strata 4-5. Especially considering that the project zone is limited to the immediate project area and its surroundings: in the case of stratum 4 semi-arid scrub and in stratum 5 degraded grassland with very limited forest remnants in drainages. The annotated list of 62 species found in strata 1-2, multiplied by 20% should give us a list of 13 mammals. Personal observations of project director Brian Krohnke and project employees Carlos Enríquez, Martín Maldonado and Gerardo Cuasapaz confirm the presence of Wild Rabbit, Armadillo, Skunk and the Andean Fox (*Pseudalopex culpaeus*), the last of which is not found in strata 1- 3. Clearly there must also be mice, rats and bats. Piet Sabbe, a Belgian landowner near to the stratum 5 project zone recalls the day some 10 years ago when the valley´s last observed kinkajou (*Potos flavus*) was carried down the road, dead over the shoulder of a local hunter.

Consulting with different authorities regarding biodiversity in Ecuador[39], did not provide any studies or other information on species of different taxa in the project zone. The nearest information available is from the protected area Bosque Protector Golondrinas (Provided by Jaime Levy, director Fundación Altropico). However, a close look at the project zone in stratum 5 shows that it is comprised entirely of degraded grasslands with sparse, remnant forest in the deeper drainages. In essence, it is a transitional zone between the dry Interandean valley and tropical rainforest, a man made seasonally dry grassland, or as commented by project developer, "like a sub-tropical paramo", an ecological oxymoron. This is not natural but rather man-made habitat and common sense observation shows that there is a poverty of species as compared to what is present in nearby HCV forests outside of the project zone.

Following from project aim to create, recreate, strengthen and protect bird habitats, it is one project hypothesis that the avifauna in the project zone in Imbabura will enjoy positive impacts. This question will be asked again and answered over time during project monitoring. To help ensure these positive impacts, project will use all native trees selected due to various factors including ease of reproduction, growth rates, resistance to fire and wind and participating landowners´ desires as expressed during planning stage of this project.—The exception to this rule will be windbreaks created with casuarinas (*Casuarina equisetifolia*) as 40% of trees in stratum 4 Salinas (8% project total).; chosen for their rapid growth, local availability and their ability to grow in and dominate the aggressive, non-native grasses found in project area.

Stratum 4: Salinas, Dry Forest

Located at the upper end of the altitudinal transect, ca. 1750 meters, is Dry Forest with annual average precipitation between 500-1000 millimeters.[40] This stratum faces a rather long period of drought and an appreciable surplus of rain during winter leading to runoff. Soils in this stratum originate from pyroclastic streams and mud flows of volcanis ash (lahares) and lava from the Quatenary period. They are classified as Entisol/Psamment/Uptipsamment. The northern project terrains have a zero or low erosion susceptibility, while some terrains in the south are highly susceptible, and reforesting will only lower this.

However, in the project area a majority of soils have been exhausted because of poor land management practices in the past. The trees in this zone are semi-deciduous and are smaller in diameter, density and height than in the humid tropical forests. The typical vegetation found in the area includes *Acacia macracantha, Shinus molle, Tecoma stans, Cassi sp., Caesalpinia spinosa, Juglans neotropical, Cassia tormentosa, Dodonea visosa, Sida sp.,* and the dominant scrubland grass *Melinis minutiflora*, and commonly *Gynerium sagittatum* near streams and other wet areas.

[39] Following people or institutions were contacted: SIMBIOE,; Ing. Walter Palacios, UTN; Carlos Boada - Universidad Católica del Ecuador,; Diego Tirira, Jaime Levy – Fundación Altropico,; Proyecto de Rescate Guayabillas, Paulina Baca; Paul Greenfield, MCF.

[40] Information in this section taken from *Plan de Desarrollo Cantón Ibarra: Ambiente, 2006,* which follows system of dividing life zones of Ecuador by various authors including Cañadas, Leslie R. Holdridge and Joseph Tosi.

Stratum 5: San Gerónimo

Located in La Carolina parish is lower in elevation, 900-1300 meters and enjoys higher average temperatures and annual rainfall around 1500 millimeters. Soils in this stratum originate from shales (lutitas), silex (cherts) sandstones (areniscas) and vulcanoclastics from the Cretacious and Paleocene period. They are classified as Entisol/Orthent/Ustorthent in most of the project zone and Inceptisol/ Tropept/Dystropept in the northern part. Project terrains have variable erosion susceptibility, owing to the steep slopes in this zone. The project activity of reforestation will only lower and mitigate this potential problem. This is a severely deforested area that once had habitat somewhere on a line **between Coastal foothills evergreen forest and Pre-montane evergreen forest** and shared more ecological similarities with the Very Wet pre-Montane Forests twenty kilometers and 400 meters altitude further down the road in Lita. This area is a transitional zone between the dry Interandean valley and tropical rainforest.

The typical vegetation in this stratum shares much with that of Salinas, but includes tropical species such as *Cordia alliodora* and pioneers like *Ochroma pyramidale* and a greater number of epiphytic plants, orchids, bromelias and ferns typical of sub-tropical cloud forests. Area residents speak of seeing White-fronted Capuchin monkeys, parrots, varied tanagers and other stalwarts of the Ecuadorian sub-tropics, 30 years ago.[41]

[41] Com. Per. Joselo Mina and spouse, long term residents and restaurant owners in San Gerónimo.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

By legal charter and statute, MCF is an Ecuadorian non-profit foundation dedicated to forest and bird conservation in Northwestern Ecuador. The foundation's objectives include the implementation of reforestation projects for climate change mitigation. This statute is approved by and registered with the Ecuadorian Ministry of Environment who also certify MCF's Directors on a bi-annual basis.[42] Planting native trees on degraded lands with private land-owners is an activity with no doubt as to its legality and desirability from a land-management perspective. Also project developer has been in contact and conversations with Carola Borja Osorio regarding the project since early 2009. Carola is currently the Under-secretary for Climate Change of the Ecuadorian Ministry of Environment and her formal response to our Project Idea Note and presentation is included in supporting materials folder.[43] In **Annex 1 CCB Compliance Key** please find a more detailed discussion of international treaties and local laws within which the project is structured.

1.12 Ownership and Other Programs

1.12.1 Proof of Title

MCF has signed and notarized contracts with all project participants indicating the spirit and purpose of the reforestation as well as different clauses for project management over the 30 year crediting period. All land owners involved have clear title to their lands, as established by certificates from the respective property registries and/or municipal tax payment receipts.[44]

1.12.2 Emissions Trading Programs and Other Binding Limits

Not applicable.

1.12.3 Participation under Other GHG Programs

This project has not applied for nor is seeking registration under any other GHG program.

1.12.4 Other Forms of Environmental Credit

While under development beginning in 2008, this project has not applied for or received credit, support or payments of any kind from other entities. With this version 4.1 of this project description document, we are only now in 2011 beginning planting.

1.12.5 Projects Rejected by Other GHG Programs

This project has not applied to nor been rejected by other GHG programs.

[42] See sub-folder "MCF Legal Standing docs" within folder "2_MCF-Risk Analysis and supporting docs".
[43] Oficio Nro. MAE-SCC-2011-0181 dated September 8, 2011. See also communications in "Gmail - Proyecto VCS de Mindo Cloudforest Foundation a SCC.pdf". In sub-folder "Communications Under-secretariat Climate Change" within folder "1_MCF-PD and supporting info".
[44] See sub-folder "Convenios Firmados Propietarios" within folder "2_MCF-Risk Analysis and supporting docs".

1.13 Additional Information Relevant to the Project

1.13.1 Eligibility Criteria

This project has contracts for financial support to increase lands in the project boundary to 530 hectares from the initial 346.8 hectares in this Project Description. To achieve this, the project will seek new participants adjacent and nearby to the different project activity instances found in strata 1-5. More specifically, the project proponent will seek new participants in areas near to strata 3 & 5 and to that end can demonstrate two objective pieces of evidence:

1. A signed agreement with the Ecuadorian Ministry of Environment's provincial office in Carchi, to work together to identify new lands in the parish Jijón y Camaaño, immediately adjacent to La Carolina parish where project stratum 5, San Gerónimo, is located. Jijón y Camaaño parish of Mira canton shares nearly identical baseline conditions with La Carolina parish of Ibarra canton, as they are simply two facing shores of the same river.[45]

2. A letter of interest from The Northwestern Union of Campesinos and Populations of Pichincha (*Unión Noroccidental de Organizaciones Campesinas y Poblacionales de Pichincha, UNOCYPP*) coming after a formal meeting with them to present our project and its objectives on December 2nd, 2011. This union has members in 30 different communities many of which are near to our stratum 3 and have near identical baseline conditions. This expansion area holds the potential to build upon and strengthen the biological corridor we propose in the project profile included in Annex 3.[46] Faber Ubidia UNOCYPP's Project Director, also has assured us that they are finishing cartography of their members' properties including current land use information with the help of Conservation International, Ecuador, and that this mapping should be ready in January, 2012.

Given the above and in the interest of achieving full compliance with the VCS Standard 3 (15 July, 2011, v3.1) section 3.4 on Grouped Projects and also AFOLU Requirements VCS Version 3, (8 March 2011, v3.0) section 3.7 Grouped Projects, the project proposes the following unified criteria for including each new instance of the project activity:

- Site specific eligibility assessment as according to the 'Procedures to define the eligibility of lands for afforestation and reforestation project activities' (EB 35 report Annex 18, vs. 01, 19 October, 2007).
- Site specific additionality assessment to demonstrate that new areas are subject to the same (or at least as conservative) baseline scenario and rationale for the demonstration of additionality as with initial project activity instances.
- Site specific risk analysis comparison with current instances of project activity. Where it is determined that there is significant difference in project risk between the most similar of the project's ex-ante strata and the new project instance, either a new risk-analysis will be performed or the potential new instance will be discarded from inclusion in the project.

[45] See signed agreement in sub-folder "Communications Under-secretariat Climate Change" within folder "1_MCF-PD and supporting info".
[46] See letter of interest in sub-folder "Other reference materials" within folder "1_MCF-PD and supporting info".

- Project monitoring as described in section 4 will apply the same equations for the determination of sample plots and control for all new project activity instances.

The geographical limits for the inclusion of new project activity instances are as follows:

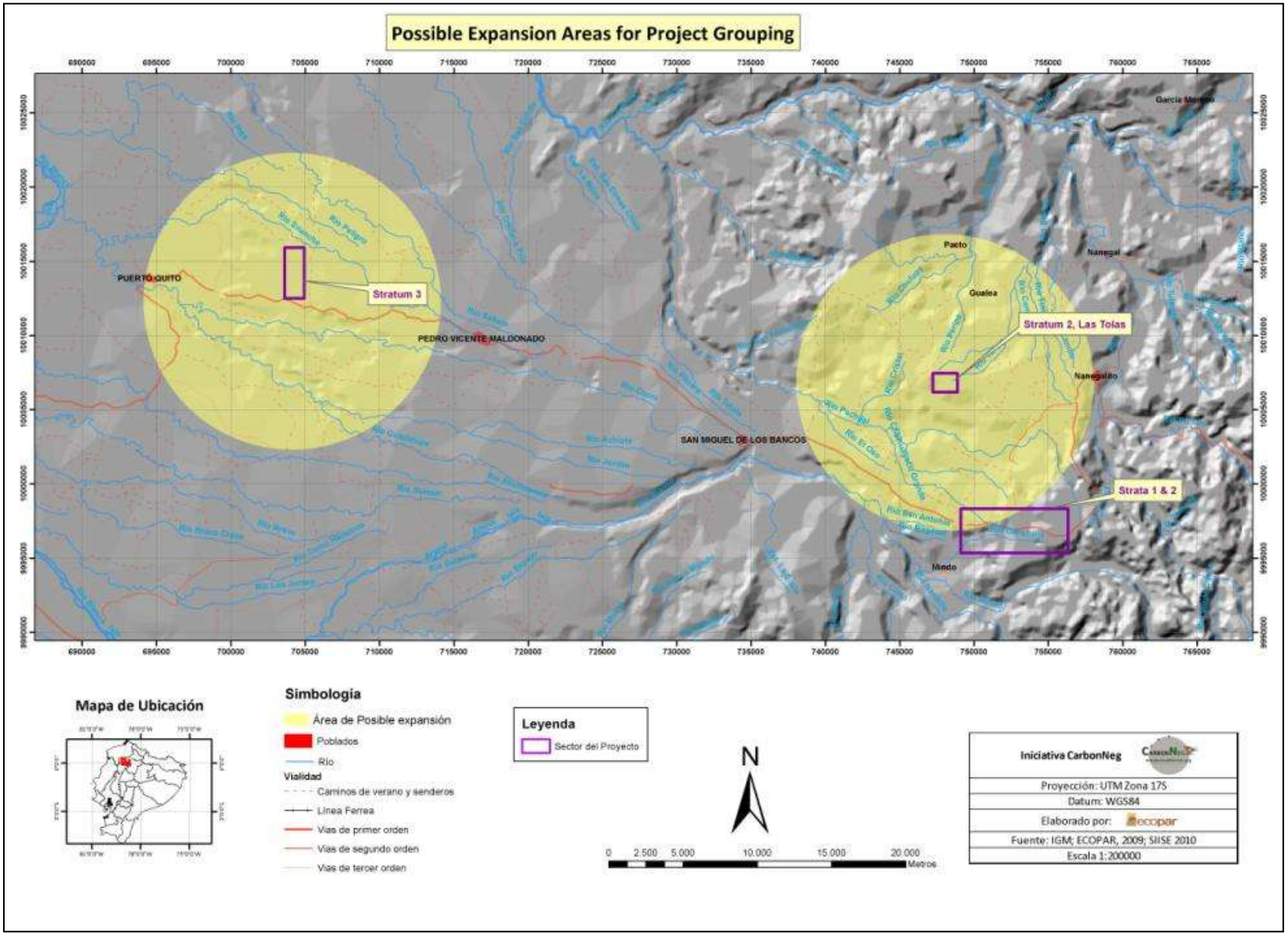
- Within the Mira watershed an irregular polygon that includes parts of Imbabura and Carchi provinces; and in Pichincha province two circles of 10 kilometer radius with their centers located as indicated:

Table 8: Geographical limits for the inclusion of new project activity instances

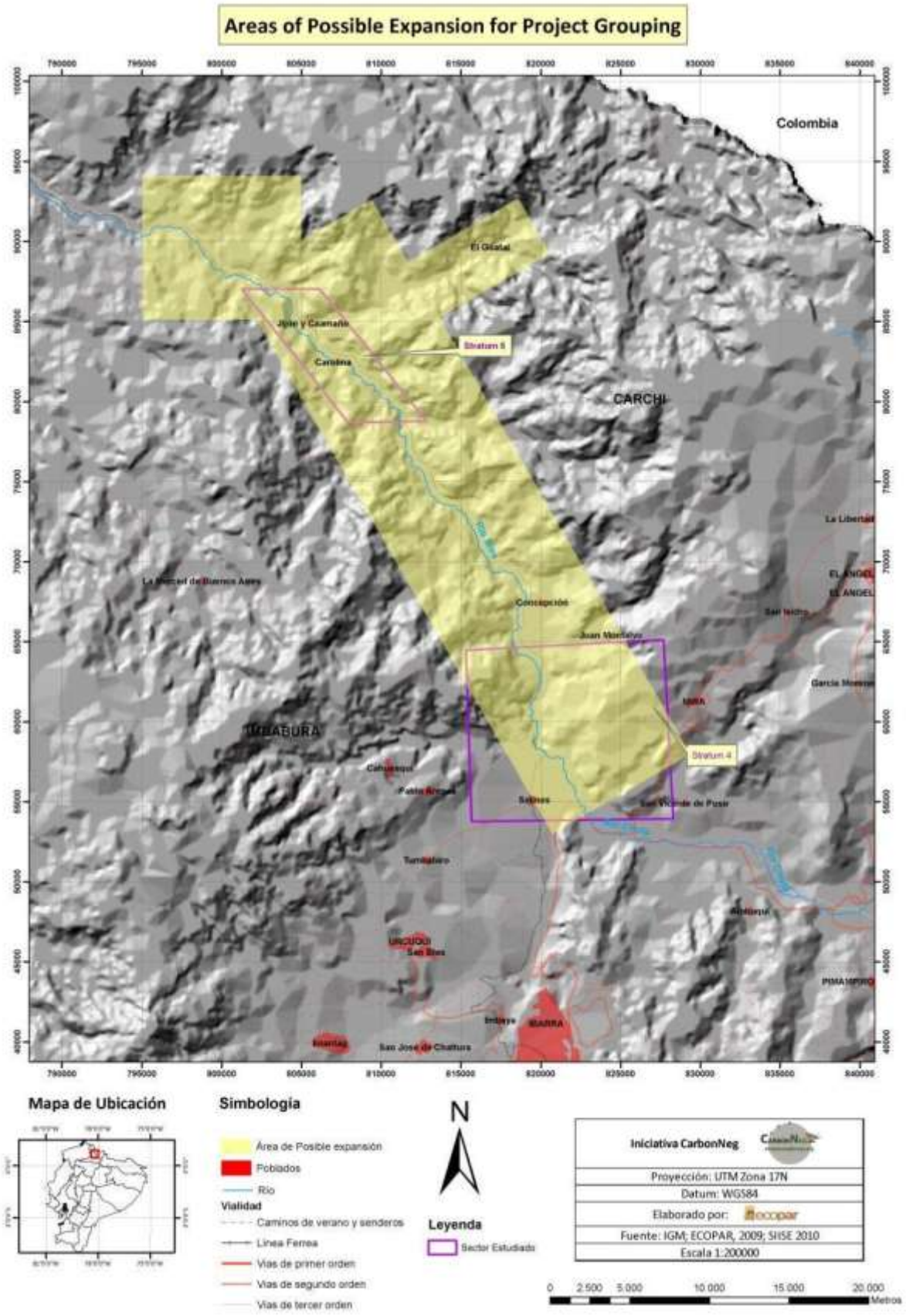
Polygon	UTM WGS 84	Form			Description
Strata 1 & 2	Zone 17 S	Circle	748045	10006834	Center
Stratum 3	Zone 17 S	Circle	704133	10012317	Center
Strata 4 & 5	Zone 17 N	Irregular Polygon	805001	94107	Angle
			795001	94107	Angle
			795001	85107	Angle
			802189	85107	Angle
			820735	52985	Angle
			829395	57985	Angle
			813660	85239	Angle
			820588	89239	Angle
			818588	92703	Angle
			811660	88703	Angle
			809395	92626	Angle
			805001	90107	Angle

This plan to include at least 180 more hectares obeys the current contract obligations and funding from companies in Belgium and the USA who aim to neutralize their CO2 and equivalent emissions with this project. In operational terms this means that while project has contracted trees with various nurseries beginning in May, 2011, and will plant the 346.8 hectares described in this design document during the rainy season December-April 2011-2012, it will also continue until it reaches a total of approximately 530 hectares of plantings during the period 2012-2014.

Please see maps of proposed expansion areas on following page and requisite KML file in folder “1_MCF-PD and supporting info”.



Map 18: New project activity instances in strata 1-3



Map 19: New project activity instances in strata 4-5

Capacity Limits:

According to the CDM Rulebook (http://www.cdmrulebook.org/558) at COP/MOP 3 the original 8 kiloton limit for Small-scale A/R projects was revised upward to 16 kilotons. And, in this initial version of the Project Description the project has a Long Term Average of less than half that amount. Then, with the inclusion of 51% more land (185 new hectares in addition to the 346 identified in this document) the project shall still be under this theoretical limit. However, the primary funder of this project has only contracted for 7,500 tCO2e, and the secondary funder of this project for years is currently only interested in roughly 500 tCO2e annually and while their contributions are expected to grow in coming years, they will be held to the 16 kiloton limit, even if the project is netting more.

1.13.2 Leakage Management

Not applicable.

1.13.3 Commercially Sensitive Information

There is no commercially sensitive information withheld from this version of the project description.

1.13.4 Further Information

Since this project also aims to obtain the CCB standard, more information on community and biodiversity aspects of this project have already been discussed in detail in sections 1.1 and 1.10.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

CDM Executive Board AR-AMS0007 / Version 01.0.1, EB 56, Annex 10, 17 June 2011.

2.2 Applicability of Methodology

According to AR-AMS0007 / Version 01.0.1 all project lands must meet applicability conditions beginning with the definition of project lands as: “Grassland. Rangeland/pasture-land subjected to any kind of anthropogenic exploitation that may include systems with woody vegetation that does not impair eligibility of the land for A/R CDM project activities.” All parcels belonging to the 13 participating landowners meet this definition and they do not contain organic soils or wetlands as defined in the Good Practice Guidance for Land Use, Land-use Change and Forestry (IPCC, 2003). Also, during project crediting period forest litter will remain on site and is not removed as part of the project activity.

Pursuant to the applicability criteria in AR-AMS0007 / Version 01.0.1 regarding ploughing/ripping/scarification of project lands, the planned activity also qualifies. Project design calls for clearing of .25m^2 of grass and scrub per tree planted and project will plant 1000 trees per hectare in project boundary. Thus, a total of 250 m^2 (less than 3%) of soil area in project

boundary will be disturbed during the first year of crediting period, and this will be done following land contours. Estimated replanting of 25% of project trees during subsequent two year period, to account for plant mortality, will only disturb less than 1% of topsoil in project boundary and then not be repeated during the 30 year crediting period, thus meeting conditions (i-iii) listed in methodology.

2.3 Project Boundary (or "Project Area" as defined by CCB)

While the geographic range of the project is extensive, the participating properties are neatly grouped in 5 strata defined by physical proximity and by their altitudinal and ecological similarity. The 13 participating properties are shown in table 9 on following page, including information regarding their location, name of property owner, number of hectares in the project and general habitat type. Precision maps of the distinct project boundaries in each stratum follow the table.

This PDD compiles work done in 2008 in Pichincha province and in 2009 in Imbabura province. Originally this work was conceived of as two separate PDDs that have now been merged to meet project funders' needs. This resulting document is considered the 4th version of the project whose earlier iterations had been prepared on the CDM PROJECT DESIGN DOCUMENT FORM (CDM-SSC-AR-PDD) - Version 02 and methodology AR-AMS0001, Version 05. In original documents there were several more properties and project hectares. Now, after revisiting all lands and re-contacting all participants we have in essence narrowed the field (no pun intended). In both 2008 and 2009 the non-profit Ecopar Corporation assisted MCF with multi-temporal analysis of project land and that procedure followed the same two steps, pre-selection and multi-temporal analysis, which are described and documented below to define the Project Boundary.

Definition for Project Boundary follows CDM EB 44 Report Annex 16 "GUIDANCE ON APPLICATION OF THE DEFINITION OF THE PROJECT BOUNDARY TO A/R CDM PROJECT ACTIVITIES" (Version 01).

Table 9: Participating properties

Pichincha Province						Total ha.
Canton	Parish	Sector	Name	Stratum	Hectares	Strata
SM Los Bancos	Mindo	Sta. Rosa	Brian Krohnke	1	10.2	
SM Los Bancos	Mindo	Sta. Rosa	Grecia Flores	1	22.1	
SM Los Bancos	Mindo	Sta. Rosa	Marcelo Vasconez	1	20.9	
Quito	Nanegalito	San José	Richard Parsons	1	16.5	69.7
SM Los Bancos	Mindo	San Tadeo	Ramiro Salazar	2	8.2	
SM Los Bancos	Mindo	San Tadeo	Piedras Negras	2	28.9	
Quito	Gualea	Las Tolas	La Yumbada	2	14.3	51.4
Pedro Vicente Maldonado	PVM	23 de Febrero	Rafael Ferro	3	42.7	42.7
					TOTAL PICHINCHA	163.8
Imbabura Province						Total ha.
Canton	Parish	Sector	Name	Stratum	Hectares	Strata
Ibarra	Salinas	Salinas	Ximena Enríquez	4	67.0	67.0
Ibarra	La Carolina	San Gerónimo	Richard Wheeler	5	77.0	
Ibarra	La Carolina	San Gerónimo	Thelmo Grijalva	5	17.0	
Ibarra	La Carolina	San Gerónimo	Eduardo Moreno	5	9.0	
Ibarra	La Carolina	San Gerónimo	Gerardo Cuasapaz	5	13.0	116.0
					TOTAL IMBABURA	183.0
					TOTAL TWO PROVINCES	346.8

All project lands are currently grasslands and their eligibility is demonstrated using the 'Procedures to define the eligibility of lands for afforestation and reforestation project activities' (EB 35 report Annex 18, vs. 01, 19 October, 2007). This is demonstrated following a two step process. And while, as mentioned, this process was carried out at different times in the two provinces, the first step is essentially the same for both and the second step had important differences as there were different maps, images and technologies used. For this reason, in this combined PDD the first step is described for the entire project boundary and the second separated by province.

First Step: All selected lands were visually assessed against the Ecuadorian forest definition by trained MCF personnel and Ecopar technicians. All lands classified as forests have been omitted to include only eligible grasslands. None of the selected grasslands contain young natural stands or plantations nor are they temporarily unstocked forest lands. Natural regeneration on selected degraded grasslands is not occurring due to grazing, pasture management and exotic and

aggressive grasses. Especially in strata 1-3, pasture management includes the periodic clearing with machetes of pioneering trees and other woody vegetation that appear. Below are representative photographs of project lands in each of the 5 project strata.

STRATUM ONE: Brian Krohnke

Picture 12

STRATUM ONE: Marcelo Vásconez

Picture 14

STRATUM TWO: Ramiro Salazar

Picure 13

STRATUM THREE: Rafael Ferro

Picture 15

STRATUM FOUR: Ximena Enríquez

Picture 16

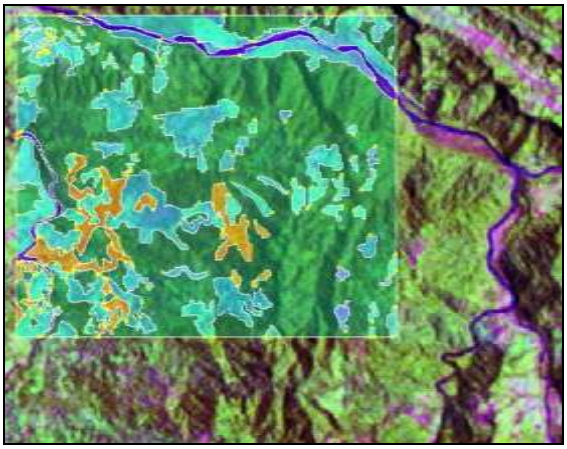
STRATUM FIVE: Thelmo Grijalva

Pictures 17, 18

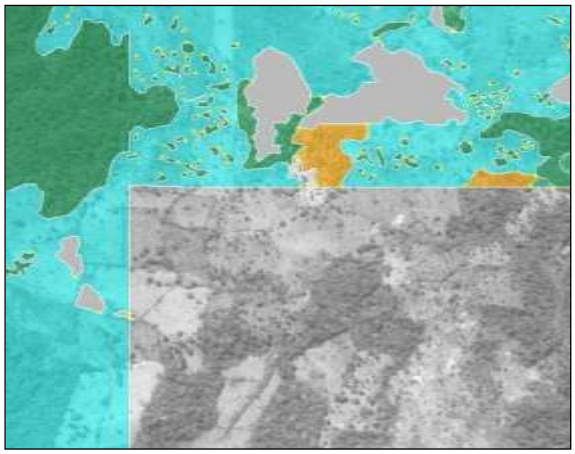
STEP TWO, in Pichincha, Strata 1-3:

For the Pichincha province areas once the general pre-eligibility was determined through field visits as described in Step One, and a review of reference points taken with GPS was performed, the eligibility of each work area polygon was established by their location on cartography created for this analysis based on geo-referenced aerial photography from 1983 & 1990 and satellite imagery from 1991. Later, this information was reviewed and confirmed by adding a layer with a 2008 Aster image.

After geo-referencing the Landsat imagery with the UTM coordinates zone 17 south, Datum WGS 84, they were assigned colors for interpretation. After scanning the aerial photographs they were imported to the software TNT MIPS version 6.9, then geo-referenced and critically visually interpreted according to basic land use categories. Each type of land coverage thus interpreted was assigned an attribute for its identification.



Picture 19



Picture 20

This procedure was integrally realized with ArcView 3.2 GIS software. Before comparing the different land use changes by work area polygon, the total area by land use and type of vegetative cover was calculated for each year that imagery was available. Once completed, this information was cross referenced at the same scale allowing the detection of changes and the type of changes between one date and the other.

The series of GIS procedures summarized here resulted in the creation of the following eligibility maps, which follow the simple numerical sequence 1-5 in agreement with project *ex ante* stratification. These eligibility maps are in sum, the project boundary, each with total hectares which will be planted. Following the eligibility maps, in section 2.4 Baseline Scenario there is another series of multi-temporal maps following the same logical strata sequence and objectively demonstrating project compliance with the 'Procedures to define the eligibility of lands for afforestation and reforestation project activities' (EB 35 report Annex 18, vs. 01, 19 October, 2007).

SECOND STEP, in Imbabura, Strata 4-5: The activity is a reforestation project activity because all participating grasslands were deforested before 31 December 1989. The majority of deforestation in this region came after the Agrarian Reform Laws of the late 1960s and early

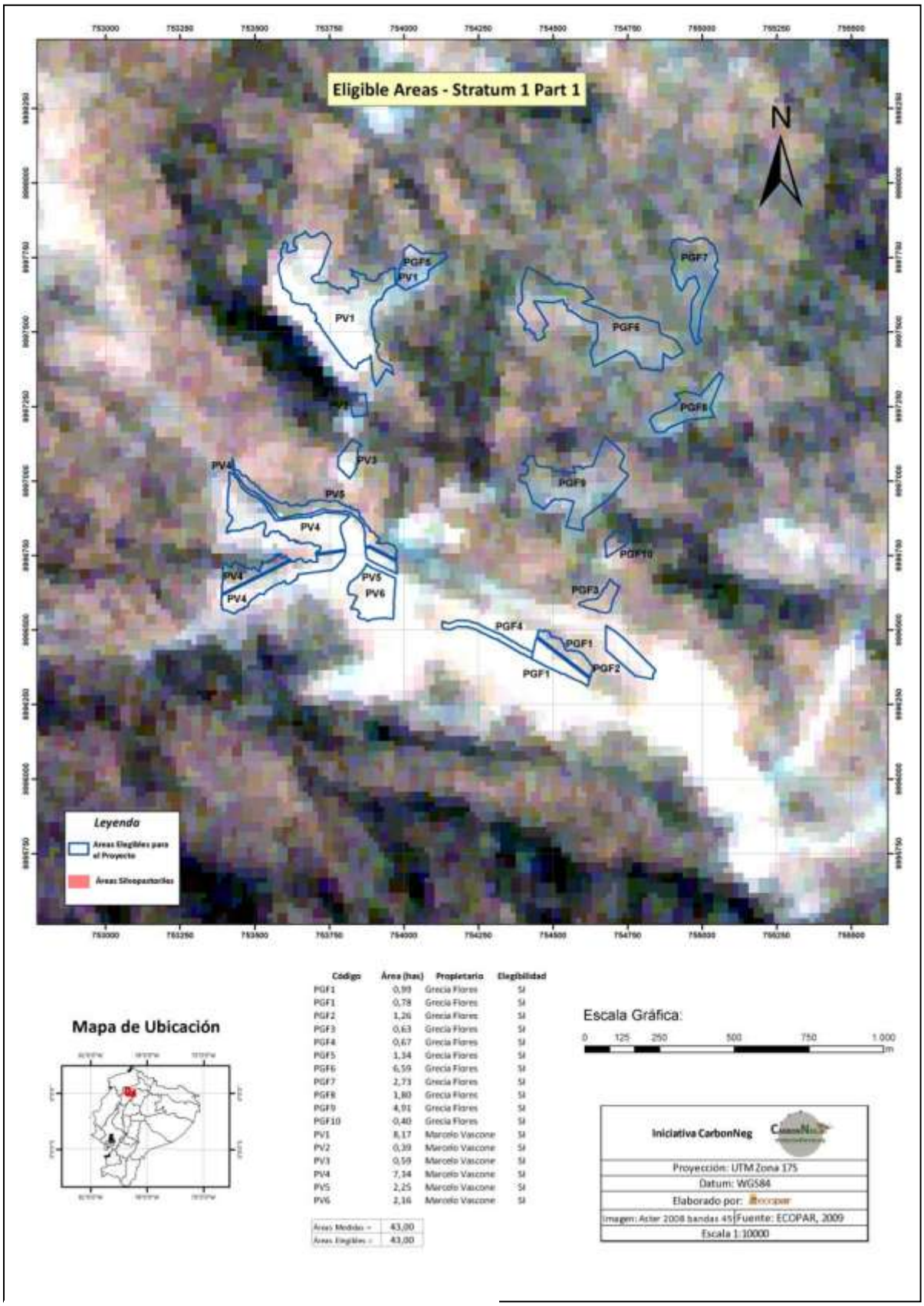
1970s. Once the general pre-eligibility of project areas was determined through field visits as described in Step One, a review of reference points was conducted. These points were taken with GPS in datum set WGS 84, 17 South, and were located on Landsat images from September and November, 1987, two years prior to pre-1990 limit established as CDM eligibility requirement.

To complete the multi-temporal analysis, Aster satellite images from 2007 were also used to compare current vegetative land cover with 1987 land cover. As in pre-eligibility points taken above, this work was divided into two sectors: the first around the Enríquez sisters´ properties in Salinas; and the second around San Gerónimo. These two work areas or strata are signaled on the Project Location map (p. 14) and in the Eligibility and Multi-temporal Analysis maps in coming pages.

Once the pre-eligibility of each sector was established, each participating land area was mapped with Thales Mobile Mapper GPS units, one acting as base unit for differential calculations and one as roving field unit. The calculation of measurement differentials with information obtained with reports from REGME (Network GNSS of Continuous Monitoring of Ecuador run by the Military Geographic Institute) allows for accuracy within 50 centimeters for each point taken, assuring that project land area totals are precise. (Information on actual percentage error for each sector is archived with project documents for third party verification.)

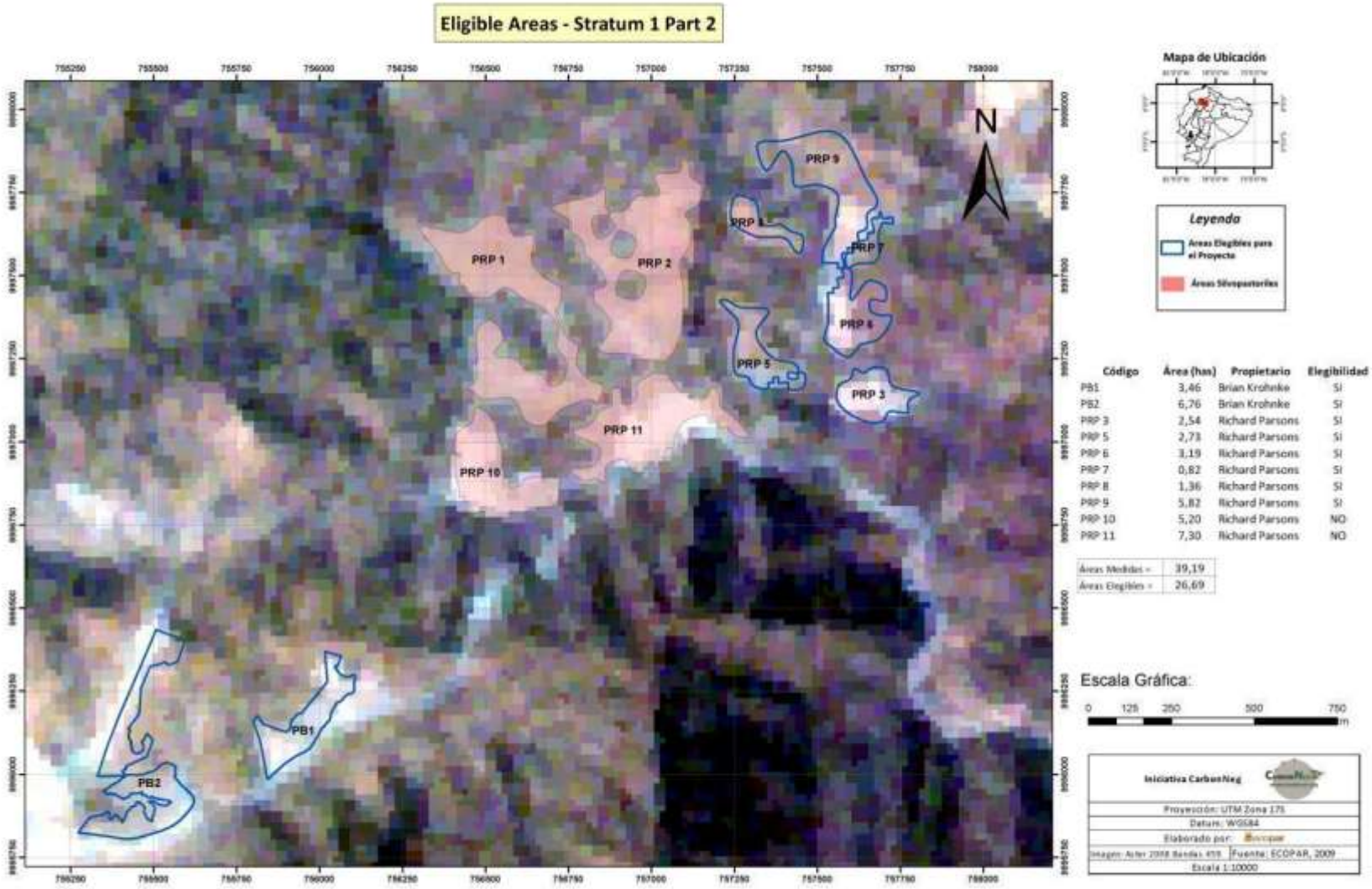
The work area polygons, ‘project boundary’, thus created were plotted on the multi-temporal maps described above to arrive at final project work areas and hectare totals.

The project boundary thus defined will remain unchanged for the definition of Project Area as regards the CCB standards.

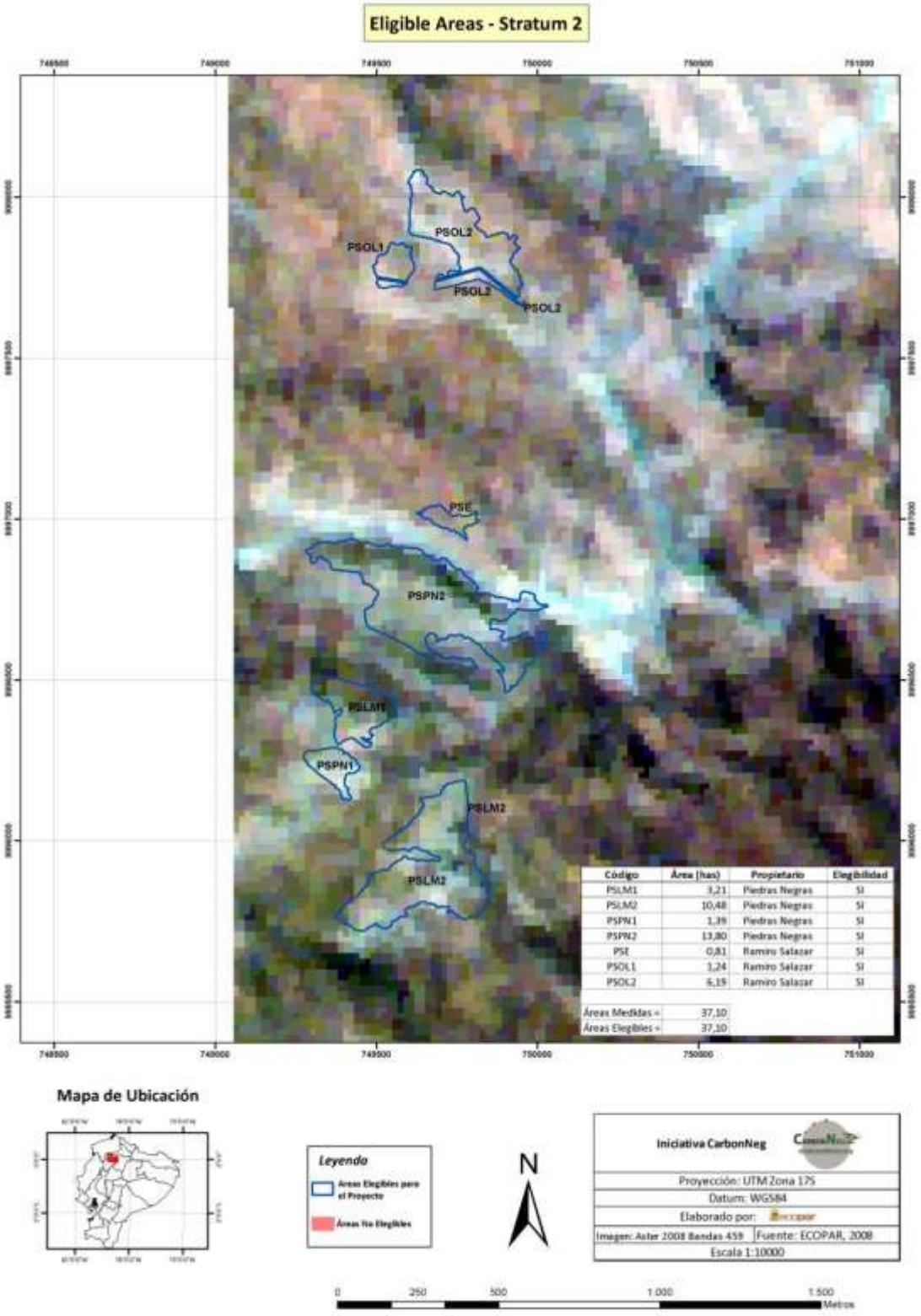


Código	Área (has)	Propietario	Elegibilidad
PGF1	0,99	Grecia Flores	SI
PGF1	0,78	Grecia Flores	SI
PGF2	1,26	Grecia Flores	SI
PGF3	0,63	Grecia Flores	SI
PGF4	0,67	Grecia Flores	SI
PGF5	1,34	Grecia Flores	SI
PGF6	6,59	Grecia Flores	SI
PGF7	2,73	Grecia Flores	SI
PGF8	1,80	Grecia Flores	SI
PGF9	4,91	Grecia Flores	SI
PGF10	0,40	Grecia Flores	SI
PV1	8,17	Marcelo Vascone	SI
PV2	0,39	Marcelo Vascone	SI
PV3	0,59	Marcelo Vascone	SI
PV4	7,34	Marcelo Vascone	SI
PV5	2,25	Marcelo Vascone	SI
PV6	2,16	Marcelo Vascone	SI
Áreas Medidas =	43,00		
Áreas Elegibles =	43,00		

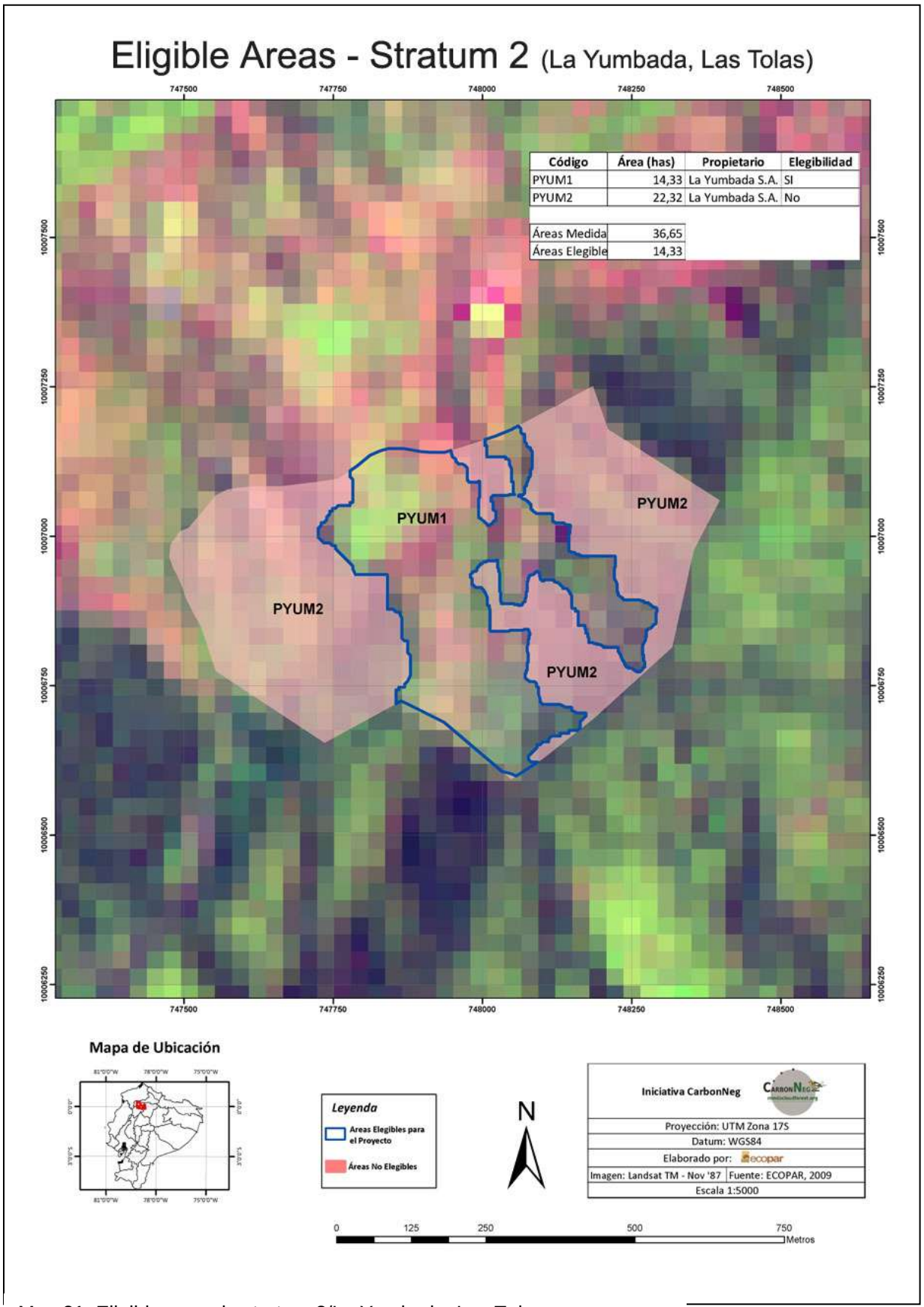
Map 18: Eligible areas in stratum 1/part 1



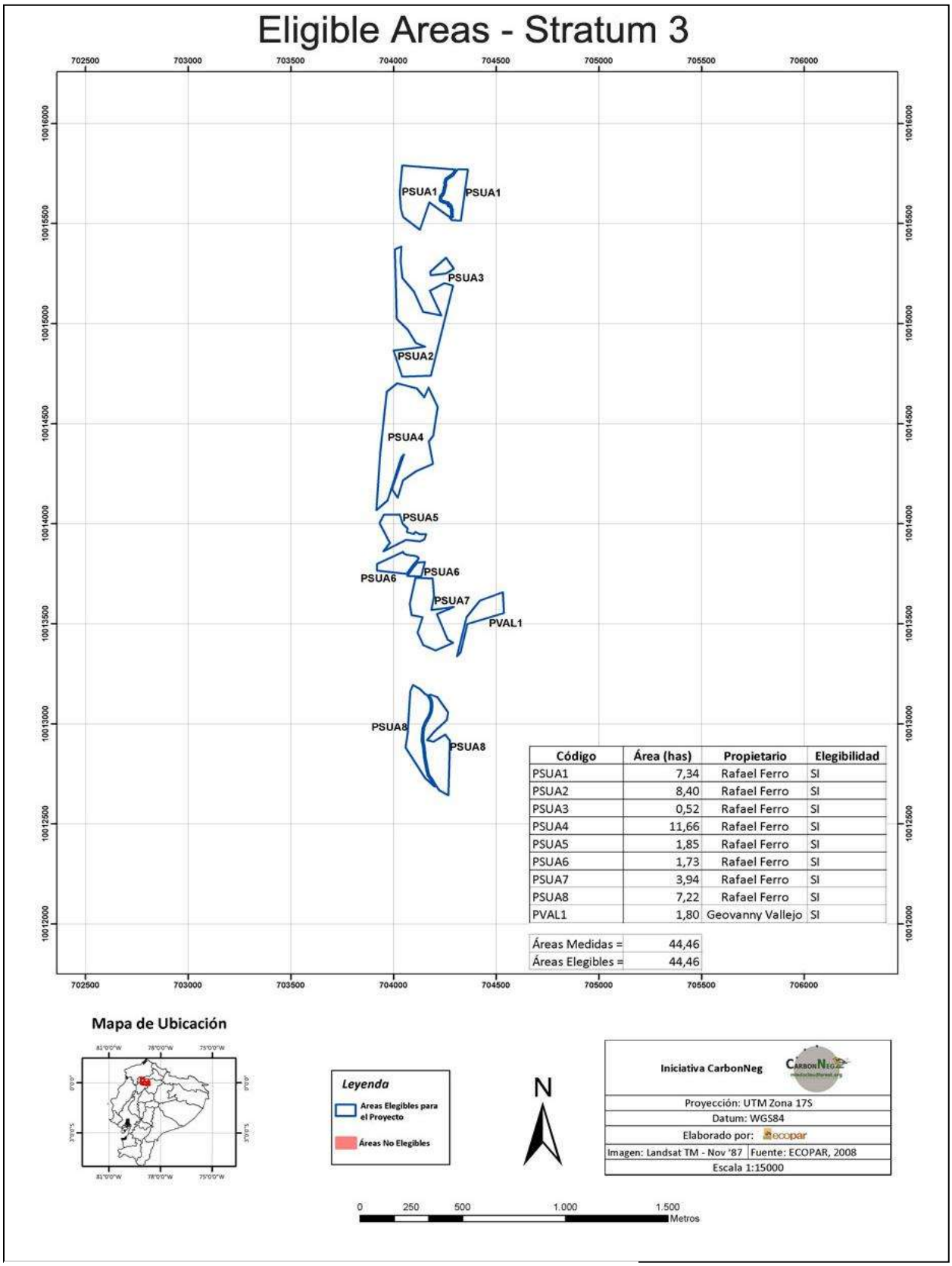
Map 19: Eligible areas in stratum 1/part 2



Map 20: Eligible areas in stratum 2



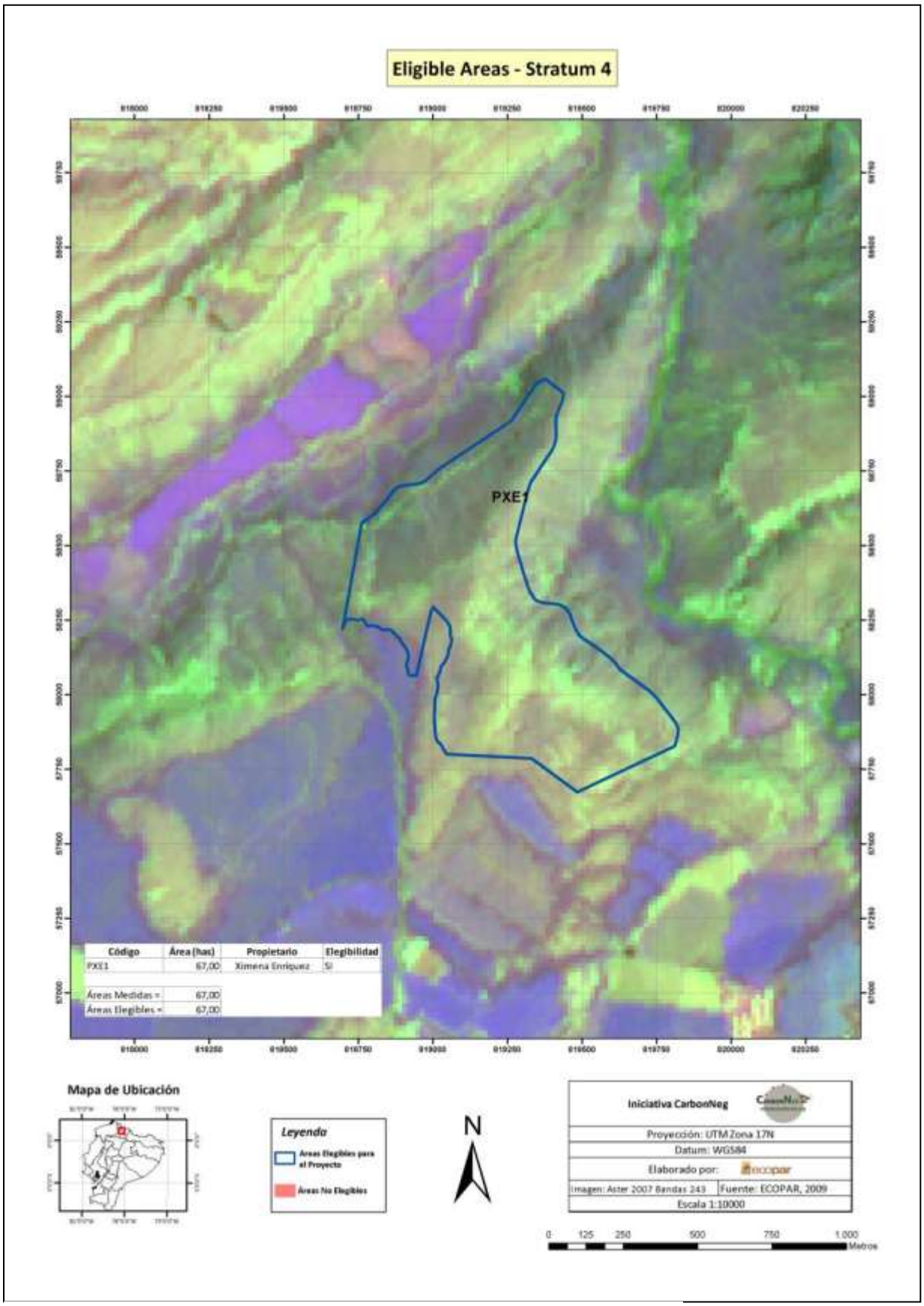
Map 21: Eligible areas in stratum 2/La Yumbada, Las Tolas



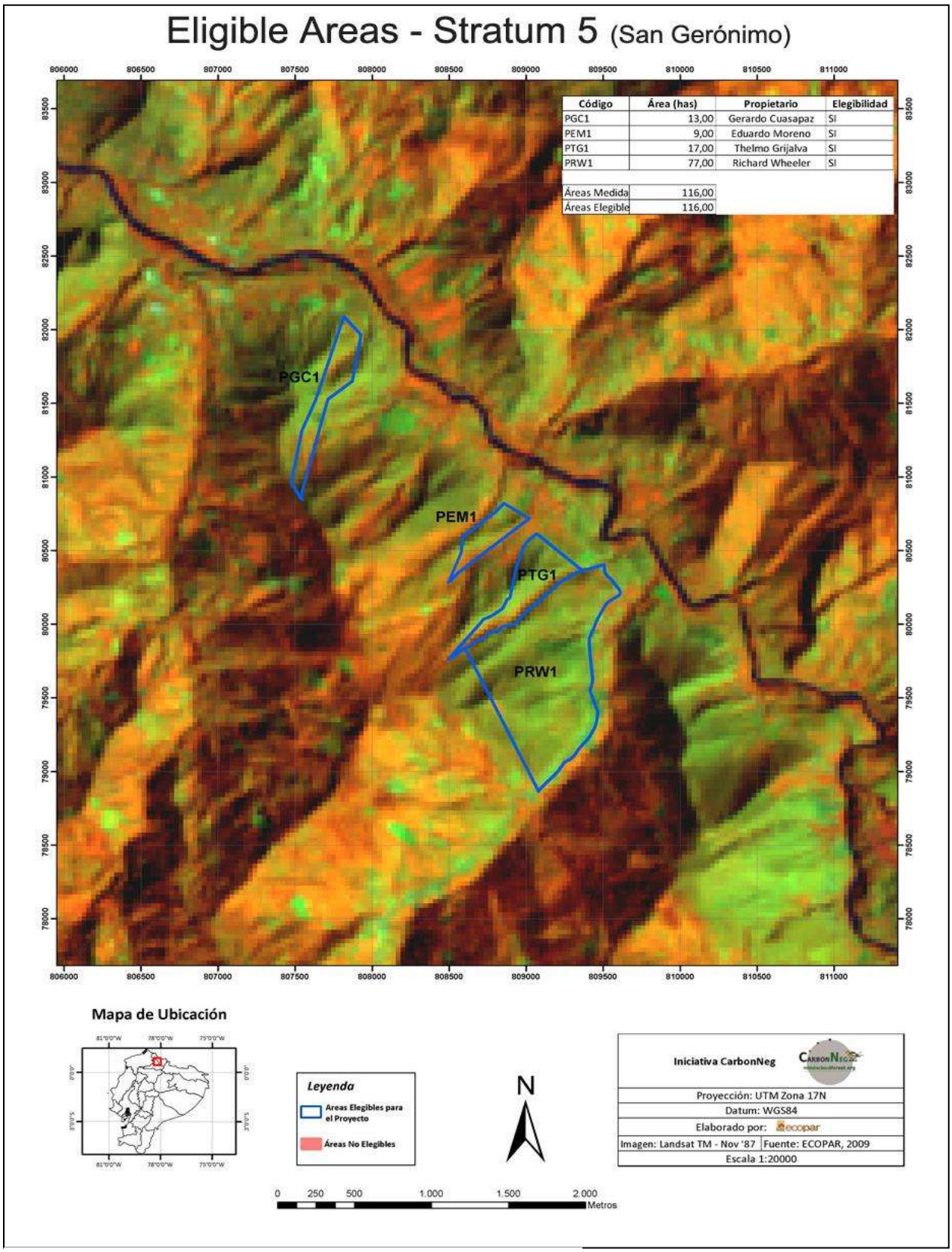
Código	Área (has)	Propietario	Elegibilidad
PSUA1	7,34	Rafael Ferro	SI
PSUA2	8,40	Rafael Ferro	SI
PSUA3	0,52	Rafael Ferro	SI
PSUA4	11,66	Rafael Ferro	SI
PSUA5	1,85	Rafael Ferro	SI
PSUA6	1,73	Rafael Ferro	SI
PSUA7	3,94	Rafael Ferro	SI
PSUA8	7,22	Rafael Ferro	SI
PVAL1	1,80	Geovanny Vallejo	SI

Áreas Medidas =	44,46
Áreas Elegibles =	44,46

Map 22: Eligible areas in stratum 3



Map 23: Eligible areas in stratum 4



Map 24: Eligible areas in stratum 5

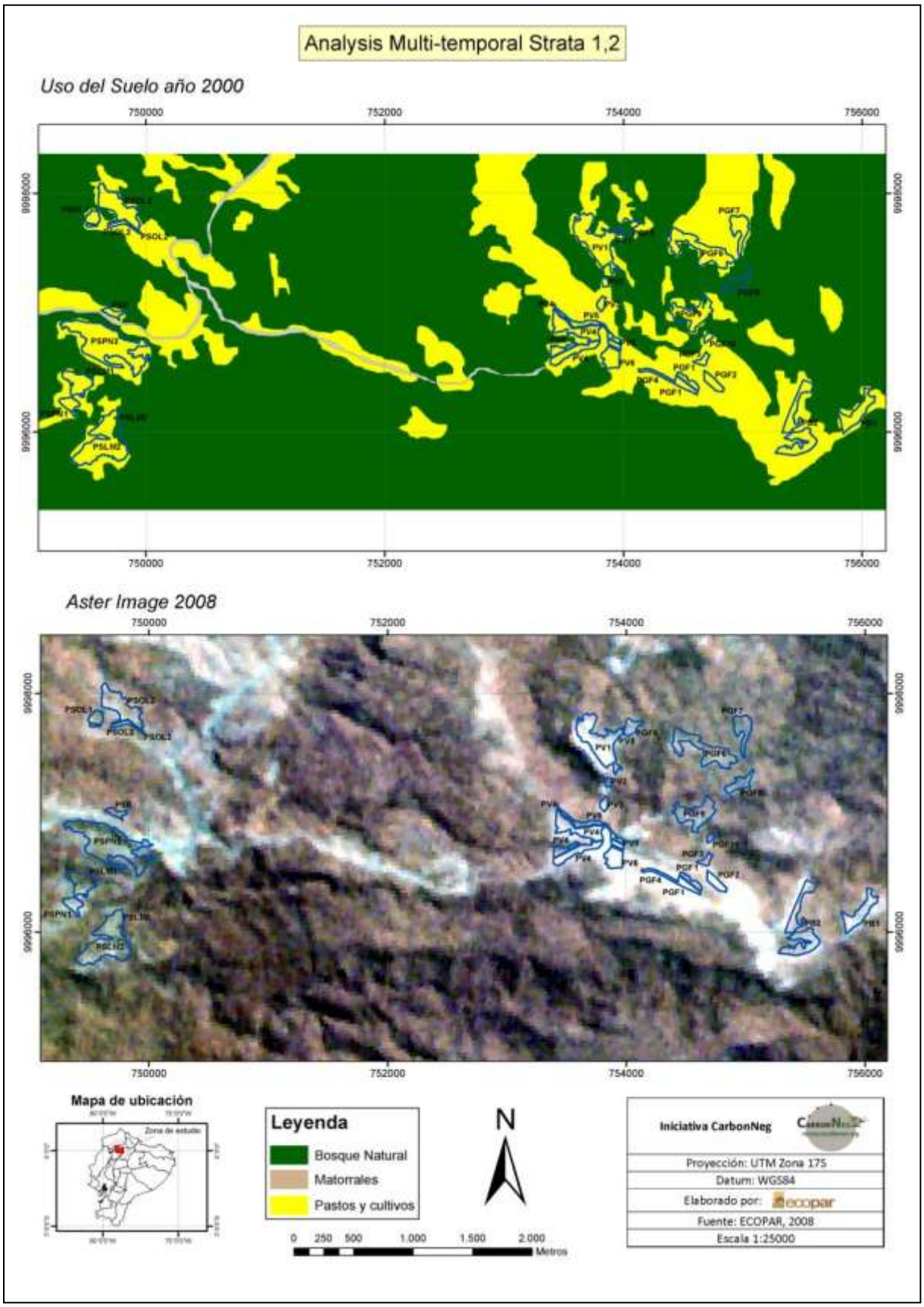
Table 10: GHG Pools that will be considered in the Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Living Biomass Pool	CO_2	Yes	Major carbon pool affected by the project activity*
		CH_4	No	Beyond means of project
		N_2O	No	Beyond means of project
		Other	No	
	Organic Soil Carbon	CO_2	Yes	Carbon stock in this pool can possibly decrease initially because of soil disturbance during site preparation. Hence accounting of this pool is required*
		CH_4	No	Beyond means of project
		N_2O	No	Beyond means of project
		Other	No	
Project	Living Biomass Pool	CO_2	Yes	Major carbon pool affected by the project activity*
		CH_4	No	Beyond means of project
		N_2O	No	Beyond means of project
		Other	No	
	Organic Soil Carbon	CO_2	Yes	Carbon stock in this pool can possibly decrease initially because of soil disturbance during site preparation. Hence accounting of this pool is required*
		CH_4	No	Beyond means of project
		N_2O	No	Beyond means of project
		Other	No	

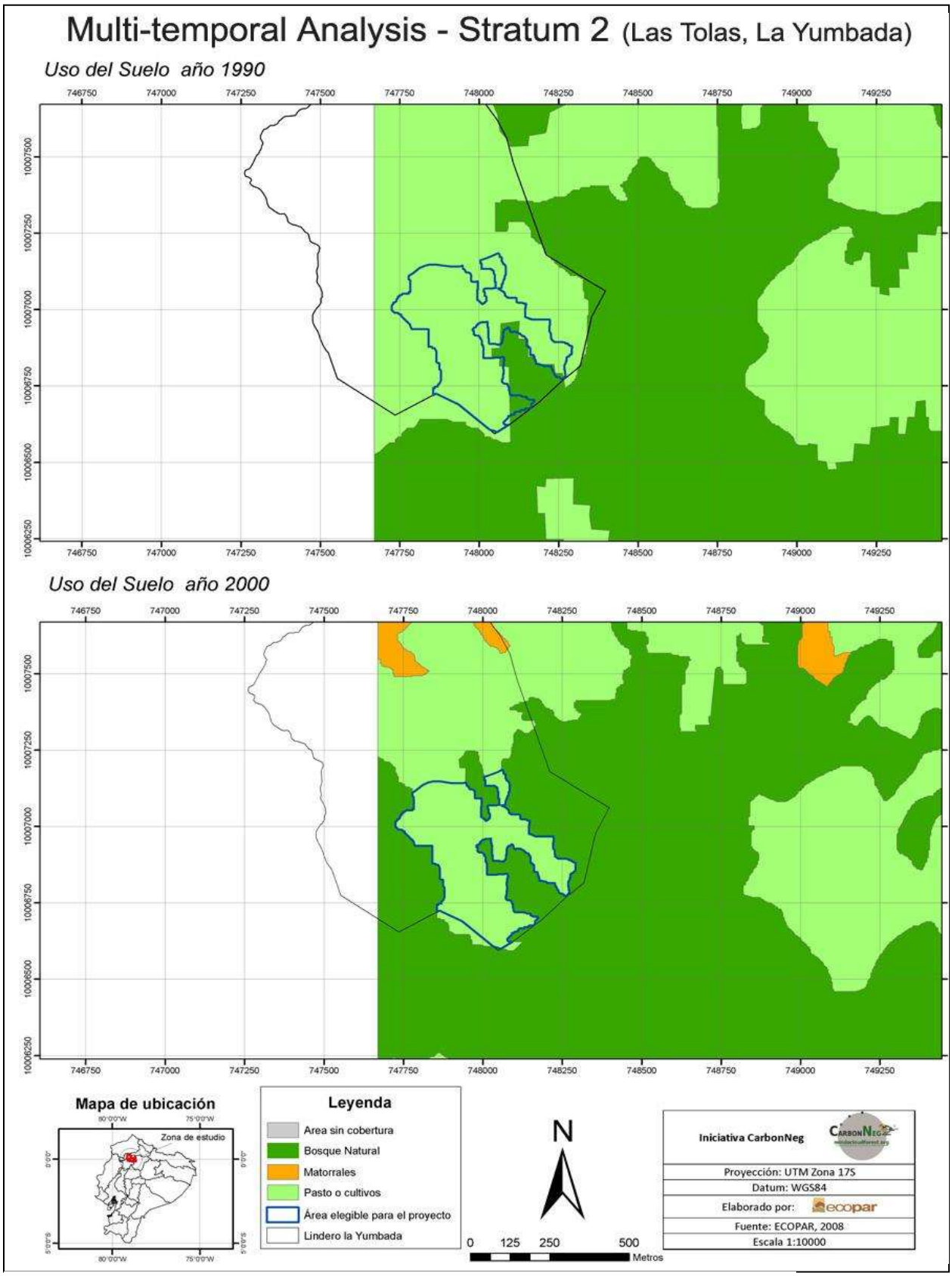
* Following Methodology AR-AMS0007 / Version 01.0.1

2.4 Baseline Scenario

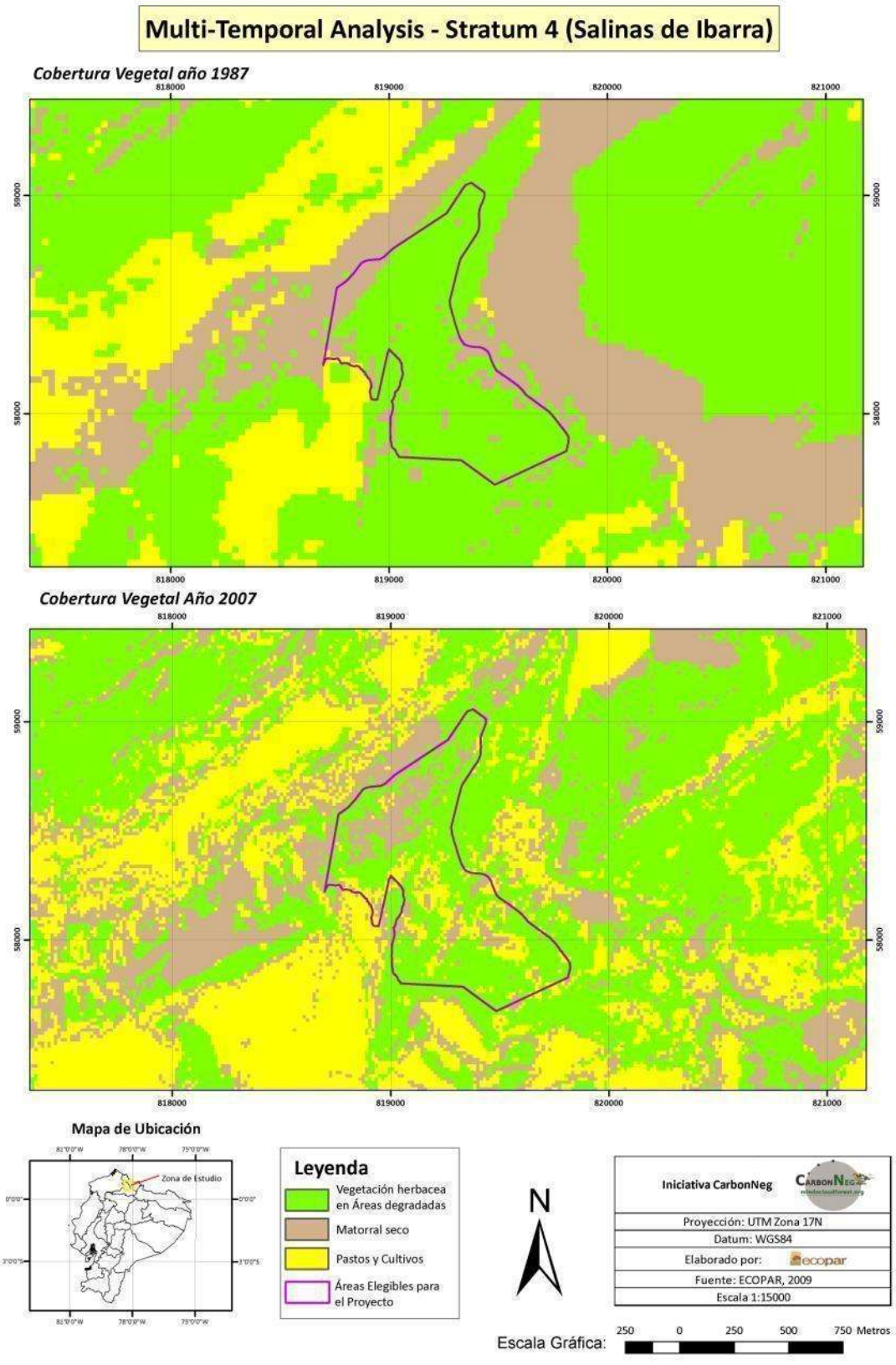
In accordance with AR-AMS0007 / Version 01.0.1 “The most plausible baseline scenario of a small-scale A/R CDM project activity implemented on grasslands or croplands is continuation of pre-project land use.” As mentioned elsewhere in this PDD project developer knowledge and contact with many of the participating landowners and familiarity with project boundary goes back over a decade. Then, more specifically, initial work on the Pichincha province portion of this project was begun in 2008 and in Imbabura in 2009. Recent, 2011, site visits and photography show no perceivable change in forest cover on project grasslands or other changes in carbon stocks. This reality is objectively demonstrated in following images created with remote sensors and GIS software by Ecopar personnel.



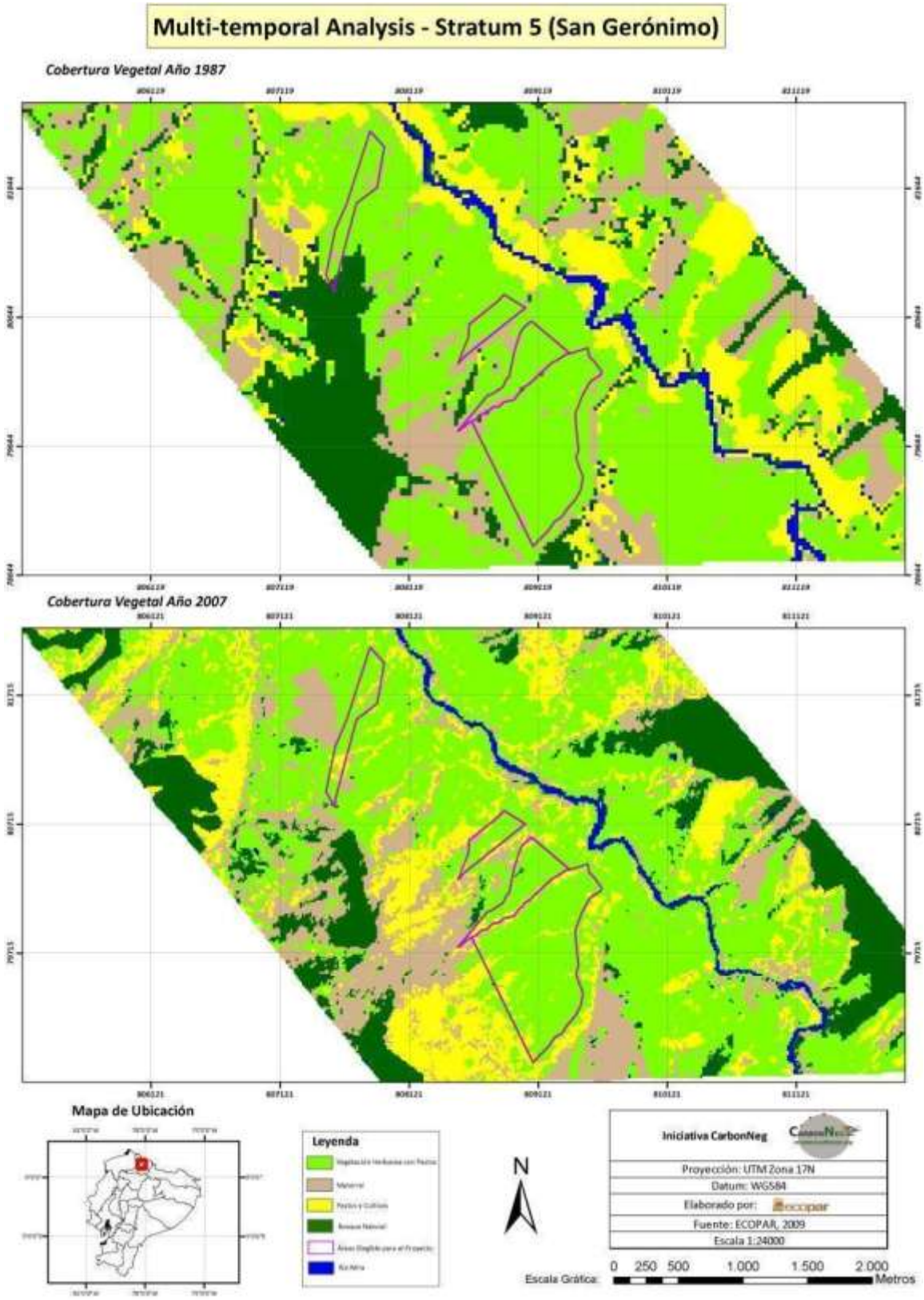
Map 25: Multi -temporal analysis strata 1-2



Map 26: Multi -temporal analysis stratum 2 (La Yumbada, Las Tolas)



Map 27: Multi -temporal analysis stratum 4



Map 28: Multi -temporal analysis stratum

NOTE: Project was unable to obtain either aerial photography or satellite images from any date prior to 10 years ago without clouds of Rafael Ferro land, Stratum 3. However, according to the EB 22 Report Annex 16 "PROCEDURES TO DEFINE THE ELIGIBILITY OF LANDS FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES", without the availability of "(a) Aerial photographs or satellite imagery complemented by ground reference data; it is also possible to use (b) Ground based surveys (land use permits, land use plans or information from local registers such as cadastre, owners register, land use or land management register). Project proponent has archived documents and statements from mister Ferro that objectively demonstrate this part of the property boundary´s compliance with the 1-11-2001 non-forest definition parameter. This material is archived with project contracts and was available for project auditors at time of field visit.

2.5 Additionality

In accordance with AR-AMS0007 / Version 01.0.1, Annex 1, "Assessment of Additionality" project proponent "shall demonstrate that the project activity would not have occurred anyway due to at least one of the following barriers," and of the list provided, 5 different subcategories of barrier "**(f) Barriers due to local ecological conditions…"** come in to play in varying degrees on the 16 different properties in the project boundary. That being said, all of the properties also face the economic barrier of the costs of reforestation, especially as this is reforestation for habitat creation which will give only marginal economic returns and on a time scale that would prohibit any at-risk investment in the activity. Especially in strata 1-3, these future economic returns will be included in project monitoring, especially for CCB criteria CM3, as compared to baseline scenario of land use for cattle grazing. The ecological barriers faced are:

(i) Degraded soil (e.g. water/wind erosion, salinization);

In the case of Ximena Enriquez's property in Salinas, stratum 4, not only are the soils eroded but they are arid, to the point that native 'Guarangos' and 'Faiques' (*Caesalpinia spinosa* and *Acacia macracantha*) remain stunted where present and exposed to wind, but where they are not exposed to wind they grow more adequately, in arroyos or where protected by windbreaks. Investment is required to overcome this ecological barrier with the application of basic irrigation and the establishment of wind breaks with *Casuarina equisetifolia.* This investment however would never be able to demonstrate a positive cost/benefit relation without carbon financing. See picture 16 taken during dry-season on page 31 to better understand the ecological conditions in Salinas. The band of acacias and other native vegetation seen behind Ximena's head is outside of the project boundary bordering an irrigation channel that services the sugar cane plots that provide the economic sustenance of these farms. As of October, 2011, Ximena is installing tubing and a reservoir to extend the range of irrigation available on her land and available for project plantations, especially for their establishment over the first few, critical years.

(ii) Catastrophic natural and/or human-induced events (e.g. land-slides, fire);
(iv) Pervasive opportunistic species or group of species preventing regeneration of trees (e.g. grasses, weeds);
(v) Unfavorable course of ecological succession;

Below a picture of Richard Wheeler´s land in San Gerónimo, stratum 5, was taken on May 15th, 2011 at the end of the rainy season and shows the dominant grass and weeds that help prevent

natural regeneration of tree species (barrier **iv**). This stratum is also facing barriers **ii** and **v** to its natural regeneration. In this area in the last couple of years fire prevention through social pressure and awareness building has risen in part due to the efforts of area residents Gerardo Cuasapaz, Piet Sabbe, Joselo Mina, and also fire and police stations have been opened in San Gerónimo creating a new atmosphere of development where once this was a very barren crossroads. However, use of fire during decades has left the area barren of trees and at a point of broken ecological succession. Also, please recall photograph of Peter Ramos on page 7 where burning is occurring in neighboring Carchi province across the Mira river to appreciate what San Gerónimo suffered in the recent past (barrier **ii**). Barrier **v** is in part the result of the loss of bird species and other natural vectors which would ordinarily help introduce seeds. In San Gerónimo native cloud forests are present on all ridge tops, but as demonstrated in the multi-temporal maps, these forests have not returned to the lands within the project boundary as a result of the combination of these barriers.

Picture 21

(vi) Biotic pressure in terms of grazing, fodder collection, etc.

All project lands in Pichincha province were cleared to establish pasture and have been grazed at different times both intensively and sporadically. In the specific case of Brian Krohnke and partners' property a small dairy operation is maintained to create income to pay the caretaker. This is currently the only possible activity on the land without further investment and has been the case since property purchase in 1996. Brian is the lead project developer of this PDD as well as a board member of MCF since 2001, and he and partners are dedicated environmentalists, but

simple economics have kept them from reforesting the pasture areas of their property. Comments from other participants in Pichincha tell essentially the same story. Where participants Ferro and Salazar do not own their own cattle, they rent their grazing lands to neighbors as a relatively hands-off means to augment property incomes. They cannot forego this income to let lands regenerate naturally as the process takes too long and will diminish their property value; with carbon financing on the other hand, they are assured of having high-value, species-diverse plantations established in less time.

2.6 Methodology Deviations

Not applicable.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

To calculate baseline emissions for the two carbon pools (the living biomass pool considered as the sum of the above-ground and below-ground biomass pools and the soil organic carbon pool) accounted for in project boundary, project proponent has followed a three step procedure:

1. Stratification of project boundary;

2. Determination of baseline net GHG removals in living biomass following AR-AMS0007 / Version 01.0.1 and EB 46 Report Annex 16 “GUIDANCE ON CONDITIONS UNDER WHICH THE CHANGE IN CARBON STOCKS IN EXISTING LIVE WOODY VEGETATION ARE INSIGNIFICANT” (Version 01).

3. Determination of GHG emissions and removals in the second pool accounted for in project boundary in the baseline scenario, soil organic carbon.

1.- In accordance with guidelines established in AR-AMS0007 / Version 01.0.1, Chapter II Baseline Methodology Procedure and its item 9 regarding the stratification of project lands, project proponent has adopted a simple 5 strata *ex ante* design where a stratum is defined by both geographical and altitudinal proximity of work areas, as well as similarity of current vegetation cover. This approach is maintained throughout the project is shown in detail in section 2.3 Project Boundary. The methodology states:

9. Stratification of the planned project area for baseline estimation is not required but may be carried out if it improves the accuracy and precision of biomass estimation.....

a. For baseline net GHG removals by sinks. It will usually be sufficient to stratify the areas on the basis of tree/shrub crown cover;

2.- Following Annex 16 “GUIDANCE ON CONDITIONS UNDER WHICH THE CHANGE IN CARBON STOCKS IN EXISTING LIVE WOODY VEGETATION ARE INSIGNIFICANT” project proponent has determined that baseline net GHG removals by woody vegetation will remain constant and so can be counted as zero for all lands within the project boundary as condition (i) will be met:

(i) Existing trees and/or shrubs within the area are allowed to remain, are not expected to be impacted by A/R project activities, and shall be excluded from estimates of project net GHG removals by sinks;

This exclusion of existing trees and/or shrubs will be demonstrated during monitoring phase of project following recommendation:

(a) For condition (i): existing trees and/or shrubs are allowed to remain, are not impacted by project activities, and shall not be included in estimates of project net GHG removals by sinks, as part of the project management plan how the state of the existing trees and or shrubs is to be maintained (e.g., by permanently marking the trees/shrubs, by controlling the use of fire during site preparation, and by planting only to within some minimum distance of the existing trees/shrubs). Also record and archive as part of the CDM-AR-PDD photographic evidence of the state of the existing vegetation prior to any site preparation;

3.- As regarding soil organic carbon, project proponents follow AR-AMS0007 / Version 01.0.1 #13: "Since carbon stock in soil organic carbon (SOC) is unlikely to increase in the baseline, the change in carbon stock in SOC may be conservatively assumed to be zero for all strata in the baseline scenario".

Conclusion: Given the methodological conclusions reached in 1-3 baseline net removals will be counted as zero.

3.2 Project Emissions

Equation 2 from AR-AMS0007 / Version 01.0.1:

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E$$

where:

ΔC_{ACTUAL}	Actual net GHG removals by sinks; t CO_2-e
ΔC_P	Change in the C stocks in all selected carbon pools in project scenario, since the start of the project activity; t CO_2-e
GHG_E	Increase in non-CO_2 GHG emissions as a result of the implementation of the A/R CDM project activity within the project boundary, since the start of the project activity; t CO_2-e

For ease of understanding this is a two step process wherein each variable is calculated separately, and we proceed to calculate the last of these variables first:

1. **Increase in non-CO_2 GHG emissions within the project boundary. AR-AMS0007 / Version 01.0.1 states:**

19. The only increase in GHG emissions within the project boundary which results from the implementation of the A/R CDM project activity and which is required to be accounted for is the non-CO_2 GHG emission from burning of biomass for site preparation and/or forest management. It is estimated as:

$$GHG_E = \sum_{t=1}^{t^*} E_{BIOMASS\_BURN,t} \quad (4)$$

where:

GHG_E	Increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the proposed A/R CDM project activity; t CO_2-e
$E_{BIOMASS\_BURN,t}$	Increase in non-CO_2 GHG emissions due to burning of biomass of existing vegetation as part of site preparation and/or forest management in year *t*, as estimated in the tool "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity"; t CO_2-e

This project does not plan to nor will use fire as a management tool in the preparation of project lands. The CDM A/R tool "Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity" indicates that the increase in non-CO_2 GHG emissions within the project boundary as a result of the implementation of the proposed A/R CDM project activity should be neglected (i.e. GHG_E=0); given that the increase in non-CO_2 GHG emissions due to burning of biomass of existing vegetation as part of site preparation and/or forest management in year *t is* nonexistent ($E_{BIOMASS\ BURN,\ t}$ = 0).

In other words, $\Delta C_{ACTUAL} = \Delta C_P$.

However, according to the CCB standard, other emissions resulting from project activities should be taken into account as well. This concerns burning for site preparation (mentioned above), fossil fuel combustion, emissions from synthetic fertilizers and decomposition of N-fixing species.

As project monitoring will involve travels from both experts and national and international university students it is foreseeable that considerable project emissions will be created. A registration form will be completed during the project period by the involved monitoring actors for the emissions caused by their motorized movements (number of kilometers by plane/car/motorcycle and their respective emissions in tCO2 e). As a matter of policy the PP will compensate its emissions from international flights immediately by recognized, compensation schemes external to the project (www.atmosfair.de). The accumulated GHG emissions that have not been compensated will be added to the project buffer of non-saleable tCO2e or even not usable tCO2e in terms of climate neutralization of the clients. This implies that these emissions they will not be part of the calculated net GHG removals since the expected contribution of these emissions cannot be predicted.

Only organic fertilizers will be used, thus emissions from synthetic fertilizers are equal to 0.

Forestry systems incorporating N-fixing trees have been shown to be socially beneficial and are thought to be environmentally friendly, both enriching and stabilizing soil. However, the effect of such systems on the emissions of the important greenhouse gas nitrous oxide (N2O) and the tropospheric ozone precursor nitric oxide (NO) is largely unknown. Generally, NO and N2O emissions are significantly correlated with soil available N (NH4 and NO3). The improved soil fertility underneath the trees provide a larger pool of mineral N and yield larger rates of NO and N2O emissions.

Emission from the decomposition of N-fixing species used is estimated to be lower than 5% and thus not accounted for. However during the project period we will monitor and register these. A baseline soil chemical analysis will be performed to verify the available mineral N. This soil analysis will be done at time of project verification so that changes can be analyzed. By then more research will be done about this issue and respective conclusions will be drawn.

3.3 Leakage

Following the recommendation of AR-AMS0007 / Version 01.0.1 in the section on Leakage #22 it is only necessary to calculate project leakage if, after using the guidelines mentioned below, the conclusion is that grazing activities displaced by the project are not insignificant. However, in the **CDM – A/R WG** Twenty-sixth meeting Annex 1 DRAFT GUIDELINES ON CONDITIONS UNDER WHICH INCREASE IN GHG EMISSIONS RELATED TO DISPLACEMENT OF PRE-PROJECT GRAZING ACTIVITIES IN A/R CDM PROJECT ACTIVITY IS INSIGNIFICANT (Version 01) in section III. PROCEDURE:

> 4. The increase in GHG emissions due to displacement of pre-project grazing activities attributable to the A/R CDM project activity is insignificant if at least one of the conditions (a) to (d) below is met:
>
> (b) The total area expected to be displaced is more than 5% of the entire A/R CDM project activity or more than 50 ha, and the n-a ha (where “n” is the area in ha expected to be displaced and “a” is 5% of the total project area or 50 ha) are displaced to:
> (ii) Existing grasslands with the carrying capacity that allows for accommodation of the displaced animals during the entire period of displacement;

Cattle to be displaced from the project boundary are only found in the project lands in Pichincha province, as the lands in Imbabura are abandoned. As mentioned in the section 2.5 Additionality, cattle are present on all project lands in Pichincha but are for the most part not the property of project participants, but rather belong to owners external to the project, renting grazing rights. Applying the formula described above we establish the following:

- n= The project boundary in Pichincha total 164 ha
- a= 50 ha
- n-a =114

Average stocking rate in this area is roughly one bovine per hectare.[47] Following the formula this means that the areas around the project boundary would need to have the capacity to accommodate roughly 114 head of cattle, and this is clearly the case. Two concrete examples:

1. One neighbor (and possible future project participant) of stratum 1, Santa Rosa, Eduardo Goetschel, has over 100 hectares of pastures currently without cattle, as his land had been rented for several years, but has recently been returned to Eduardo´s control (Pers. Com. Eduardo Goetschel 1 July, 2011.)
2. Project participants Rommy Idrobo and Christian Marlin, partners of Agrícola La Yumbada S.A., have only recently bought their property with more than 60 hectares of pasture and currently have no cattle. With our project they only plan to reforest 14.3 hectares, the steepest and most degraded area of the farm. This would mean that on their remaining pastures they would have capacity for roughly half the animals that will be displaced by the project. (Pers. Com. Rommy Idrobo, 2 July, 2011.)

Without searching very far, there is currently unstocked pastureland available in the vicinity of the project boundary. Further, project developer from personal knowledge of the area can attest that certainly there are many other similar, under-stocked properties too. Thus, project developer has determined that project leakage is insignificant and following AR-AMS0007 / Version 01.0.1 will count leakage as zero throughout the project calculations.

The project does foresee the selective harvest of a percentage of project trees on 4 of the 13 participating properties. This selective harvest is described and quantified in the document "MCF_PGMF_JUNIO.docx "found in the folder "4_MCF_PGMF". This sustainable harvest will amount to 13,974.57 tCO_2e estimated conservatively which are also subtracted from project results as leakage.

3.4 Summary of GHG Emission Reductions and Removals

For detailed calculations, see "MCF-Carbon Calculations.xlsx" in folder "1_MCF-PD and supporting info".

In accordance with AR-AMS0007 / Version 01.0.1, the following calculations were done:

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E$$

[47] Personal observations and experience of project developer, and also page 5: "Secondary forests as temporary carbon sinks? The economic impact of accounting methods on reforestation projects in the tropics", Roland Olschewskia and Pablo C. Benítez in Ecological Economics #55, 2005. In sub-folder "Other Reference Material" within folder "1_MCF-PD and supporting info".

where:

ΔC_{ACTUAL}	Actual net GHG removals by sinks; t CO_2-e
ΔC_P	Change in the C stocks in all selected carbon pools in project scenario, since the start of the project activity; t CO_2-e
GHG_E	Increase in non-CO_2 GHG emissions as a result of the implementation of the A/R CDM project activity within the project boundary, since the start of the project activity; t CO_2-e

Since no burning is involved in site preparation, GHG_E=0 and thus $\Delta C_{ACTUAL} = \Delta C_P$ as shown above.

As described in the Table of GHG Pools that will be considered in the Project Boundary (section 2.3 Project Boundary) PP will monitor 2 distinct pools to calculate project emissions:

1. Living Biomass
2. Soil Organic Carbon

And these pools will be accounted for using equation 3 from AR-AMS0007 / Version 01.0.1

$$\Delta C_P = \sum_{t=1}^{t^*} (\Delta C_{TREE\_PROJ,t} + \frac{44}{12} * \Delta SOC_{AL,t}) \quad (3)$$

where:

ΔC_P	Change in carbon stock in all selected carbon pools, during the period from year $t=1$ to year $t=t^*$ when verification is carried out; t CO_2-e
$\Delta C_{TREE\_PROJ,t}$	Change in carbon stock in tree biomass within the project boundary in year t as estimated in the tool "Estimation of carbon stocks and change in carbon stocks of trees and shrubs in an A/R CDM project activity"; t CO_2-e
$\Delta SOC_{AL,t}$	Change in carbon stock in the SOC pool within the project boundary in year t, as estimated in the tool "Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities"; t C

1.- The first step is to determine the change in carbon stock in tree biomass following the tool indicated by this equation. $\Delta C_{TREE\_PROJ,t}$

The PP applies the tool "Estimation of carbon stock and change in carbon stocks of trees and shrubs in an A/R CDM project activity (annex 13)", as called for in AR-AMS0007 / Version 01.0.1. And, the PP selects the stock change method as that which best fits project realities. The PP does not select the default method because this method is applicable only in the baseline, nor the increment method for lack of data.

The first step of the stock change method is: estimation of biomass stock in trees.

The tool states:

11. The tree dimensions are obtained using one of the following procedures:

(a) For *ex ante* estimation, the tree dimensions are taken from existing data sources such as yield tables, tree growth curves, or tree growth models;

(b) For *ex post* estimation, the tree dimensions are obtained from field measurements. Measurements are carried out on all the trees in sample plots laid down in each stratum. Number of sample plots and their allocation to different strata required for a targeted precision may be calculated using the tool "Calculation of the number of sample plots for measurements within A/R CDM project activities". In exceptional situations, measurements may be carried out on all the trees in a stratum where trees are few and scattered out.

While *ex post* estimation will be based on field measurements in permanent sample plots determined following the results of the tool "Calculation of the number of sample plots for measurements within A/R/ CDM project activities" and also results from the Winrock International Sampling Calculator[48], *ex ante* estimation poses a different problem due to the lack of good information such as yield table, tree growth curves or tree growth models from field inventories within the project zone or from similar areas. To resolve this problem and in accordance with the methodology, PP has used default data obtained from the IPCC Good Practice Guidance for LULUCF Annex 3A.1 Biomass Default Tables for Section 3.2 Forest Land. And these values are applied following the tool "Estimation of carbon stock and change in carbon stocks of trees and shrubs in an A/R CDM project activity (annex 13)". As explained in paragraph 12:

"Tree dimensions are converted to tree biomass by applying one of the following methods:

(a) Biomass expansion factor (*BEF*) method;
(b) Allometric equation method."

Accordingly, PP has selected the BEF method as most practical for generating a reliable and conservative *ex ante* estimation of project performance. That method is described by the following formula:

$$B_{TREE,j,p,i,t} = V_{TREE,j,p,i,t} * D_j * BEF_{2,j} * (1 + R_j) \quad \textbf{(1)}$$

where:

$B_{TREE,j,p,i,t}$	Biomass of trees of species j in sample plot p of stratum i at a point of time in year t; t d.m.
$V_{TREE,j,p,i,t}$	Stem volume of trees of species j in sample plot p of stratum i at a point of time in year t, estimated by using the tree dimension(s) as entry data into a volume table or volume equation; m^3

[48] With the help of the network of universities, the sampling plots will be installed and the baseline measurements will be done within these plots in 2012 (July-Oct).

D_j	Basic wood density of tree species j; t d.m. m^{-3}
$BEF_{2,j}$	Biomass expansion factor for conversion of stem biomass to above-ground tree biomass, for tree species j; dimensionless
R_j	Root-shoot ratio for tree species j; dimensionless

The precise calculations for this formula are found under the tab "Btree" of the Excel file "MCF-Carbon Calculations.xlsx" in the folder 1_MCF-PD and supporting info, included in the digital materials accompanying this project description. First however, PP describes how the different values for populating this formula were obtained and chosen according to the methodological Annex 23: GUIDELINES ON CONSERVATIVE CHOICE AND APPLICATION OF DEFAULT DATA IN ESTIMATION OF THE NET ANTHROPOGENIC GHG REMOVALS BY SINKS (Version 02).

II. PROCEDURE

Sources of Default Data

2. When using default data to estimate the net anthropogenic GHG removals by sinks, the following guidance should be applied when selecting sources of data:

- If an approved A/R CDM methodology requires application of a default value and provides its numerical value then the value shall be considered as the conservative one;
- Values should if possible be species-specific, with selection from the following data sources (given in order of priority; highest first):
  - Local peer-reviewed studies under similar climate/soil conditions—provided the smaller datasets typical of local studies are considered sufficiently reliable; or
  - Regional or national forest or GHG inventory for the same ecological zone (that is, the same broad climate zone, and similar soil fertility and depth); or
  - International or global forest or GHG inventory, including IPCC literature, for the same ecological zone.

Thus, in the IPCC Good Practice Guidance for LULUCF Annex 3A.1 Biomass Default Tables for Section 3.2 Forest Land we have used the corresponding values for our ecological zone:

- V = 121 m3, Table 3A.1.4
- D = when possible species or genus specific values taken from Table 3A.1.9 –2; where unavailable the conservative value D = 0.3 was applied.
- BEF_2 = 2.04, 3.4 and 6.8, Table 3A.1.10 (values discussed below)
- R = 0.27 for stratum 4 (dry forest) and 0.42 for the other strata, Table 3A.1.8

Again, citing Annex 23 Guidelines on Conservative Choice PP has determined to select these variables according to the following criteria following #4 Conservative Application of Default Data:

> (a) If two or more default values are multiplied at any step of calculations in estimation of the net anthropogenic greenhouse gas removals by sinks then the default value which is characterized by the largest standard deviation shall be at its conservative value while the remaining default values shall be using their mean values;

To determine which of the default values has the "largest standard deviation" we turn to #6 of the same guidance tool which states "*BEFs* of existing woody vegetation based on biomass stocks: -40% below the mean to +100% above" a total standard deviation of 140% and clearly the largest among the possible standard deviations. So, it is determined to use the other variables at their mean values and apply the BEF_2 value according to the instructions of this guidance "… assess the conservative value as being one standard deviation above (or below, as appropriate) mean values." So, for project strata 1-3 all within 10 minutes latitude of the equator and with average rainfall over 2,000 mm, and in agreement with the note to Table 3A.1.10 as project plantations are "young forests" PP has determined it a conservative choice to assign the mean value plus a 100% standard deviation to the BEF_2 value for these strata (3.4 + 100% = 6.8). Conversely as stratum 4 has particularly dry and harsh conditions, we also consider it a conservative choice to subtract a 40% standard deviation from the mean value (3.4 – 40% = 2.04). As stratum 5 shares some features of strata 1-4 it was determined to leave the BEF_2 value for this stratum at its mean value 3.4 as a means of conservative choice.

Results from this Tree biomass (Btree) calculation following the BEF method are reflected below in Table 13: Estimated annual average net GHG emissions reductions.

Also, PP wishes to emphasize, that as an additional measure, biomass and therefore tCO2e *ex ante* estimates for the project results were also performed using biomass increment values from tables 3A.1.6 and 3A.1.5, respectively for natural regeneration and for plantation in different conditions, depending on the availability of suitable data (geographically, precipitation, forest type) with the expert advice and help of Dr. Bruno Verbist (co-ordinator of KLIMOS – an interdisciplinary and interuniversity research platform working on climate change adaptation and mitigation in development aid) of the Catholic University, Leuven. After performing this analysis PP is confident that the BEF analysis is the more conservative approach (4% fewer tCO_2e), however this other analysis is presented in a separate document for informational purposes, see "MCF_RSVP_Rainforest_VCS.doc."

2.- To estimate changes in the soil organic carbon pool, in agreement with AR-AMS0007 / Version 01.0.1, project proponent has used the formula for calculating initial Soil Organic Carbon and for determining the change in the SOC with project activity as found in the EB 60 Report Annex 12 A/R Methodological Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities. (Version 01.1.0):

7. The initial SOC stock at the start of the project is estimated as follows:

$$SOC_{INITIAL,i} = SOC_{REF,i} * f_{LU,i} * f_{MG,i} * f_{IN,i}$$

The values used to populate each variable in the formula are taken from the tables 3 and 6 of the same tool and in essence provide a series of factors for the different general strata types which give us the following results:

Table 12: Initial soil organic carbon pool

Strata	SOC initial, i	equals	SOC ref, i	*F LU, i	*F MG, i	*F IN, i	*ha stratum
1	2275.0	Santa Rosa de Mindo	34	1	0.96	1	69.7
2	1677.7	San Tadeo, Las Tolas	34	1	0.96	1	51.4
3	2733.7	Rancho Suamox	66	1	0.97	1	42.7
4	1453.9	Salinas	31	1	0.7	1	67
5	3166.8	San Gerónimo	39	1	0.7	1	116
	11307.1	TOTAL SOC t C Initial					

This figure for $SOC_{INITIAL}$, once converted to tCO2e, is used to determine:

Parameter	Unit	Description
$\Delta SOC_{AL,t}$	t CO_2-e	Change in SOC stock in areas of land meeting the above applicability conditions, in year t

So, this figure, 11307.1 tC $SOC_{INITIAL}$ multiplied by standard IPCC conversion formula 44/12 = 41,459.2 tCO_2e. Which subtracted from SOC_{REF} (49634.2 tCO2e) shows a positive change in soil organic carbon in the project scenario of 8175.0 tCO2e, and again, in keeping with this methodological tool, we assume that "the increase in SOC content in the project scenario takes place at a constant rate over a period of 20 years from the year of planting", and so that value, 5% of 8175 or 408.75 tCO2e will be included in project calculations as shown in following table.

$$\Delta C_P = \sum_{t=1}^{t^*} (\Delta C_{TREE\_PROJ,t} + \frac{44}{12} * \Delta SOC_{AL,t})$$

Table 13 column 4 column 3

Table 13: Estimated annual average net GHG emissions reductions

Years	Estimated baseline emissions or removals (tCO2e)	Estimated evolution of SOC (tCO2e)	Estimated annual average project removals by sinks (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
2011	0	0	0	0
2012	0	408.75	7166.11	7574.86
2013	0	408.75	7166.11	7574.86
2014	0	408.75	7166.11	7574.86
2015	0	408.75	7166.11	7574.86
2016	0	408.75	7166.11	7574.86
2017	0	408.75	7166.11	7574.86
2018	0	408.75	7166.11	7574.86
2019	0	408.75	7166.11	7574.86

2020	0	408.75	7166.11	7574.86
2021	0	408.75	7166.11	7574.86
2022	0	408.75	7166.11	7574.86
2023	0	408.75	7166.11	7574.86
2024	0	408.75	7166.11	7574.86
2025	0	408.75	7166.11	7574.86
2026	0	408.75	7166.11	7574.86
2027	0	408.75	7166.11	7574.86
2028	0	408.75	7166.11	7574.86
2029	0	408.75	7166.11	7574.86
2030	0	408.75	7166.11	7574.86
2031	0	408.75	7166.11	7574.86
2032			7166.11	7166.11
2033			7166.11	7166.11
2034			7166.11	7166.11
2035			7166.11	7166.11
2036			7166.11	7166.11
2037			7166.11	7166.11
2038			7166.11	7166.11
2039			7166.11	7166.11
2040			7166.11	7166.11
2041			7166.11	7166.11
Total	**0.00**	**8175.00**	**214983.17**	**223158.17**

Next, to develop a clearer view of actual project performance, the estimated annual average project removals by sinks over the 30 year crediting period following a linear distribution as per the assumptions required by the tool:

A/R Methodological Tool

"Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities"

(Version 02.1.0)

Table 14: Estimated net GHG emissions reductions

Years	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
2011	0.0	0.0	0.0	0.00
2012	0.0	7574.86	0.0	7574.86
2013	0.0	7574.86	0.0	7574.86
2014	0.0	7574.86	0.0	7574.86
2015	0.0	7574.86	0.0	7574.86
2016	0.0	7574.86	0.0	7574.86
2017	0.0	7574.86	0.0	7574.86
2018	0.0	7574.86	0.0	7574.86
2019	0.0	7574.86	0.0	7574.86
2020	0.0	7574.86	0.0	7574.86
2021	0.0	7574.86	0.0	7574.86
2022	0.0	7574.86	0.0	7574.86
2023	0.0	7574.86	0.0	7574.86
2024	0.0	7574.86	0.0	7574.86
2025	0.0	7574.86	0.0	7574.86
2026	0.0	7574.86	0.0	7574.86
2027	0.0	7574.86	0.0	7574.86
2028	0.0	7574.86	0.0	7574.86
2029	0.0	7574.86	0.0	7574.86
2030	0.0	7574.86	0.0	7574.86
2031	0.0	7574.86	0.0	7574.86
2032	0.0	7166.11	1397.46	5768.65
2033	0.0	7166.11	1397.46	5768.65
2034	0.0	7166.11	1397.46	5768.65
2035	0.0	7166.11	1397.46	5768.65
2036	0.0	7166.11	1397.46	5768.65
2037	0.0	7166.11	1397.46	5768.65
2038	0.0	7166.11	1397.46	5768.65
2039	0.0	7166.11	1397.46	5768.65
2040	0.0	7166.11	1397.46	5768.65
2041	0.0	7166.11	1397.46	5768.65
Total	**0.00**	**223158.17**	**13974.57**	**209183.60**

4 MONITORING

This project is designed as a natural restoration project within 2 watersheds[49] with a multiple benefit aim:

1) climate change mitigation by GHG removals, in particular carbon sequestration;
2) biodiversity restoration, and
3) community creation and development.

Monitoring entails the utilization of all information related to project development to estimate at a certain moment during the project crediting period the GHG removals (VCS and CCB standard) and to assess the project results related to biodiversity and community (CCB standard).

Monitoring activities include gathering information directly from the field and from indirect sources. Further, monitoring involves making the required calculations and estimations to assess if the project is being developed according to the project design documents and the forest management plan, with the final aim to determine GHG removals as well as community and biodiversity impacts.

- Continuous monitoring of project sites and forest management will take place (e.g., site preparation and planting, re-planting, and areas affected by disturbances).
- Monitoring of survival rate will be done during the early stage of the forest establishment, covering the 1-3 year period after the planting activity. Replants will be done at latest in 2014.
- Monitoring of firebreaks will be done during the establishment and maintenance phases during the first 3 years in Stratum 5.
- The monitoring of the project and strata boundaries will be done on a regular basis.
- Monitoring of the social/community aspects will be done following the standards of the community section of the CCB standards.
- Monitoring of the biodiversity aspects will take place following the standards of the biodiversity section of the CCB standards.

Part of this monitoring process includes the installation of permanent sample plots to measure

- the growth of the trees and the amount of sequestered carbon in their biomass and
- the content of organic carbon in the soil

The collected data within the sample plots will serve the main monitoring purpose within the climate theme: the determination and verification of GHG removals.

Monitoring of leakage will be neglected, as no significant grazing and fuel-wood collection takes place according to the assumed baseline scenario.

Monitoring will be conducted by a professional team, mainly in cooperation with the Belgian and Ecuadorian universities. When needed, personnel will be trained to ensure data quality.

[49] Strictly speaking stratum 3 is located in a third watershed adjacent to the Pachijal, Rio Cuberas. And parts of stratum three are immediately adjacent to the Pachijal watershed.

In accordance with the CCB Standards (Version June 21, 2010) project proponent and third-party monitors will develop a detailed CCB Standards monitoring plan to be integrated with the following monitoring structure in the twelve month period after project validation.

4.1 Data and Parameters Available at Validation

Data Unit / Parameter:	BEF_2
Data unit:	Dimensionless
Description:	Biomass expansion factor for conversion of stem biomass to above-ground biomass for tree species or group of species j
Source of data:	IPCC default value
Value applied:	Table 3A 1.10
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	CF
Data unit:	Dimensionless
Description:	Fraction of carbon in dry matter
Source of data:	IPCC default value
Value applied:	0,5
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	D_j
Data unit:	Dimensionless
Description:	Basic wood density (tonnes d.m. per m) of $species_j$
Source of data:	IPCC and USDA wood densities
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	

Any comment:	The wood densities are not available of all species that will be used. In case of missing data a conservative default value will be used.

Data Unit / Parameter:	R_j
Data unit:	Dimensionless
Description:	Root-shoot ratio of $species_j$
Source of data:	IPCC table 3A 1.8
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	$f_j(DBH,H)$
Data unit:	tonnes per tree
Description:	allometric function linking a diameter or height of a $tree_j$ to above-ground biomass
Source of data:	
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	$V_{tree,j}$
Data unit:	m^3
Description:	stem volume of given age/diameter/height
Source of data:	
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	

Data Unit / Parameter:	F_f
Data unit:	Dimensionless
Description:	Form factor of stem
Source of data:	Default tables
Value applied:	
Justification of choice of data or description of measurement methods and procedures applied:	
Any comment:	http://fennerschool-associated.anu.edu.au/mensuration/shape.htm "Allometric equations for four valuable tropical tree species"

4.2 Data and Parameters Monitored

Data Unit / Parameter:	GPS coordinates of the boundaries of $stratum_i$
Data unit:	X and Y coordinates
Description:	
Source of data:	
Description of measurement methods and procedures to be applied:	GPS
Frequency of monitoring/recording:	Yearly till 2015
Value applied:	N/A
Monitoring equipment:	GPS and GIS (Arc-view) software
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	

Data Unit / Parameter:	GPS coordinates of the plot center of sample $plot_i$
Data unit:	X and Y coordinates
Description:	
Source of data:	
Description of measurement methods and procedures to be applied:	GPS
Frequency of monitoring/recording:	Once at baseline set-up
Value applied:	N/A

Monitoring equipment:	GPS and GIS (Arc-view) software
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	

Data Unit / Parameter:	DBH_i
Data unit:	Cm
Description:	Diameter at breast height (1,30 m) of $tree_i$
Source of data:	Measured
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Yearly during period 2011-2016, 2-yearly during 2018-2031
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	Will be used to calculate the volume.

Data Unit / Parameter:	H_i
Data unit:	M
Description:	Height of the $tree_i$
Source of data:	Measured
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Yearly during period 2011-2016, 2-yearly during 2018-2031
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	Will be used to calculate the volume.

Data Unit / Parameter:	Soil $texture_i$
Data unit:	

Description:	Main texture of the soil sample$_i$
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Once at baseline set-up
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	

Data Unit / Parameter:	Soil type$_i$
Data unit:	
Description:	Type of the soil of the plot$_i$
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Once at baseline set-up
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	

Data Unit / Parameter:	Soil depth$_i$
Data unit:	Cm
Description:	Soil depth within plot$_i$
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Once at baseline set-up
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	

Any comment:	

Data Unit / Parameter:	Soil $mass_j$
Data unit:	G
Description:	Mass of soil $sample_j$
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Yearly during period 2011-2016, 2-yearly during 2018-2031
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	

Data Unit / Parameter:	Soil $volume_i$
Data unit:	Cm^3
Description:	Volume of soil $sample_i$
Source of data:	
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Yearly during period 2011-2016, 2-yearly during 2018-2031
Value applied:	
Monitoring equipment:	
QA/QC procedures to be applied:	
Calculation method:	
Any comment:	

4.3 Description of the Monitoring Plan

4.3.1 Purpose of the monitoring plan

This Monitoring Plan fulfills the requirement that the project activity should have credible and accurate monitoring procedures in place to enable the evaluation of project performance and verification of the net anthropogenic GHG emission removals, and also the social and ecological impacts. It sets out monitoring procedures that follow the provisions outlined in this Project Description, the approved monitoring methodology AR-AMS0007 Version 01.0.1 and the CCB standards.

4.3.2 The monitoring plan in general

Table 15: General monitoring plan

Year	Project implementation and forest management	Carbon monitoring	Community and Biodiversity monitoring
2011	Contracting land owners	baseline monitoring soil and living biomass	baseline monitoring Comm-BD criteria CCB-standard
	Contracting nurseries		
	Contracting labor		
	Planting phase I in strata 1 to 5		
2012	Weeding stands phase I in strata 1 to 5	monitoring soil and living biomass	monitoring Comm-BD criteria CCB-standard
	Watering stands in stratum 5		
	National registration of stands planted in 2011		
	Replanting stands phase I in strata 1 to 5		
	Planting phase II in strata 1 to 5		
	Motivating natural regeneration		
2013	Weeding stands phase I in strata 1 to 5	monitoring soil and living biomass	monitoring Comm-BD criteria CCB-standard
	Weeding stands phase II in strata 1 to 5		
	Watering stands in stratum 5		
	National registration of stands planted in 2012		
	Replanting stands phase II in strata 1 to 5		
	Planting phase III in strata 1 to 5		
	Motivating natural regeneration		
2014	Weeding stands phase II in strata 1 to 5	monitoring soil and living biomass	monitoring Comm-BD criteria CCB-standard
	Weeding stands phase III in strata 1 to 5		
	Watering stands in stratum 5		
	National registration of stands planted in 2013		

	Replanting stands phase III in strata 1 to 5 Planting phase III in strata 1 to 5 Motivating natural regeneration		
2015		monitoring soil and living biomass	monitoring Comm-BD criteria CCB-standard
2016	technical evaluation of stands and social assessment with owners	monitoring soil and living biomass	
2017			
2018	technical evaluation of stands and social assessment with owners	monitoring soil and living biomass	
2019			
2020	technical evaluation of stands and social assessment with owners	monitoring soil and living biomass	monitoring Comm-BD criteria CCB-standard
2021			
2022	technical evaluation of stands and social assessment with owners	monitoring soil and living biomass	
2023			
2024	technical evaluation of stands and social assessment with owners	monitoring soil and living biomass	
2025			
2026	technical evaluation of stands and social assessment with owners	monitoring soil and living biomass	monitoring Comm-BD criteria CCB-standard
2027			
2028	technical evaluation of stands and social assessment with owners	monitoring soil and living biomass	
2029			
2030			
2031 2032-2042	technical evaluation of stands and social assessment with owners Implementation of sustainable, participative management plans	monitoring soil and living biomass	monitoring Comm-BD criteria CCB-standard

4.3.3 Data management

General instructions on data collection

Collecting reliable field measurements is an important part of quality assurance (QA). Standard Good practices be followed to collect reliable data to ensure credibility in the estimation of the

baseline, project emissions, leakage, and GHG removals. Particular attention shall be paid to monitoring and measurement errors. This issue will be addressed through mandatory data checks and training of field personnel.

Data storage

The project entity shall make necessary arrangements for data entry on the registry forms. The forms shall be both in paper and electronic formats to ensure that the information is stored in multiple ways. Generally data are collected in paper formats following the good practices during field measurement. Data are then transferred to a database. All paper and electronic formats are stored in MCF's offices either in Quito or Ibarra. Further, the entity shall ensure the transfer of data to the spreadsheet database. The data shall be archived using acceptable standards and stored in compliance with the instructions of the project information management system. The electronic data shall be stored securely at multiple locations using backup procedures. Project proponent and participating organizations commit to maintaining these records for more than two years beyond project crediting period.

Information management system

The project information management links the operations of the field data collection and spreadsheet database. Further it outlines responsibilities of staff involved in collecting field data and organization of the spreadsheet database. The supervisory staff overseeing the field data and spreadsheet database must check and certify the data. If any changes occurred in the data collected and processed during the month, the supervisory staff has to provide necessary clarification.

Monitoring periods and frequency

Cfr general plan

Good practices

The project personal shall use good practices for data collection. All measured and experimental data shall be documented and archived. Those good practices will enable measuring and estimating net carbon stock changes associated with the plantations under the project activity, as well as general monitoring of forestry operations. The project personal shall keep records of all activities, like changes in the actual planted areas, site preparation and forest management.

Also, in accordance with the 14 required standards and the optional standard GL3 of the CCB, project will develop robust monitoring plan not only for changes in carbon stocks but also for community and biodiversity impacts with inputs from the various partner organizations and participating universities and institutions.

4.3.4 Stratification and sampling design

The *ex ante* stratification of project is based on geophysical and climatic characteristics of the area that influence the planting scheme. Then, an *ex post* stratification will be conducted after each monitoring event, and if proved necessary, substrata will be defined to address possible changes of project boundary and plantation management in comparison to the project design. The *ex post* stratification will also address the change in carbon stocks if they are more or less variable than it is expected. Sub-strata may be grouped into one sub-stratum if they demonstrate similar tree composition, carbon stock, carbon stock change and spatial variation. Otherwise, new substrata may be defined. The ex post stratification shall be updated for the following reasons:

- Unexpected disturbances occurring during the crediting period (e.g. due to fire, pests or disease outbreaks) that have differing impacts on various parts of an originally homogeneous stratum;
- Forest management activities (cleaning, planting and re-replanting) that are implemented in a way that affects the existing stratification.
- Differing performance and results of project plantations.
- Established strata may be merged if reasons for their definition have disappeared.

The following properties of the sampling design will be taken into consideration:

1. **Sampling Frame –** The sample frame is the actual set of units from which a sample is drawn. In the case of the applied random sample, all units from the sampling frame have an equal chance to be drawn and to occur in the sample. The sampling frame generally coincides with the population of interest – the area reforested throughout the reforestation project activity. Permanent sample plots (PSPs) are used for sampling over time to measure and monitor changes of the relevant carbon stocks. Permanent plots will be installed prior to the first verification but may not be installed at time 0. GPS readings will be taken at the centre of the plot and the radius of the plot will be set. The sample plots are used to take measurements such as tree height, DBH and species type. The plots are treated in the same way as the rest of the stratum and/or sub-stratum, in terms of site preparation and weeding.

Inside the sample plots unique number tags are assigned on all trees, when trees reach a diameter of ≥ 2.5 cm at DBH. The unique tree ID allows keeping track of the information concerning individual trees. For all trees the DBH measurement will be taken at a height of 1.3 m. This is good practice in inventory and assures that the same point is measured continuously.

The field forms for every PSP shall be recorded and kept in the PSP file.

Data will be collected using the same method for all strata. This field sampled data are further processed to generate summarized statistics and finally estimate mean carbon stocks and variance for each stratum and/or sub-stratum. Because the actual variability of the project stratum will be unknown and some plots may be lost, to guarantee conservative results, the number of plots will be increased by 10% from the number determined using the method described below.

2. **Plot size** – Circular shaped PSPs of 201 m2 (radius of 8 m) will be used, since these are easy to establish and re-measure within the terrain of the project boundary.

3. Sampling number

According to the Precision Requirements of AR-AMS0007 / Version 1.0.1 “The targeted precision level for biomass estimation shall be ± 10% of the mean at a 90% confidence level. PPs may use the latest version of the approved tool for “Calculation of the number of sample plots for measurements within A/R CDM project activities” to determine the sample size and allocation of sample plots among strata.
Following that tool and its formula:

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

where:

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

N = Total number of possible sample plots within the project boundary (i.e. the sampling space or the population); dimensionless. N is equal to project area divided by the size of the sample plot; total area= 346,8ha=3.468.000m^2; sample plot=201m^2;

t_{VAL} Two-sided Student's *t*-value, at infinite degrees of freedom, for the required confidence level; dimensionless = 1.645

w_i = Relative weight of the area;

s_i= estimated standard deviation of biomass stock in stratum *i*; t d.m. (or t d.m. ha^{-1}); approximate value known from existing data related to a similar area (Hughes, R.F. et al. Patterns of carbon and nitrogen storage in mature forests across life zones of Costa Rica. Unpublished data., CATIE, mail from Miguel Cifuentes Jara)

E = Acceptable margin of error (i.e. one-half the confidence interval) in estimation of biomass stock within the project boundary; t d.m. (or t d.m. ha^{-1}), i.e. in the units used for s_i; ; default value equal to 10% of the mean biomass stock, averaged over different strata

$_{i\ 1,\ 2,\ 3,}$= biomass stock estimation strata within the project boundary;

Table 16: Calculating the number of sample plots

stratum	Ha	w_i	forest type	s_i (t dm/ha)	mean (t dm/ha)	$w_i s_i$	$w_i s_i^2$
1	69,7	0,2009804	montane cloud forest	48,09	521,24	9,665147	464,7969
2	51,4	0,1482122	premontane evergreen rain	23,32	440,11	3,456309	80,60113
3	42,7	0,1231257	coastal foothill evergreen moist	14,62	285,3	1,800098	26,31743
4	67	0,1931949	dry forest	13,05	154,79	2,521194	32,90158
5	116	0,3344867	dry forest	13,05	154,79	4,365052	56,96393
Sum	346,8	1				21,8078	661,581

n	N	t_{val} (90% CL, inf df)	$(\Sigma wisi)^2$	$\Sigma wisi^2$	E (t dm/ha)
1.328	17253,73134	1.645	475,5801358	661,581	31,1246

NOTE: This result is felt to be highly unsatisfactory to project proponent, and so as a good practice, another approach was used to attain a more conservative number.

The **Winrock Terrestrial Sampling Calculator** uses the formulae from methodologies AR-AM0001, AM0003, AM0004, AM0005, AM0006, AM0007 all large-scale methodologies which conservative judgment would hold to be more rigorous than required for our selected small-scale methodology AR-AMS0007. This sampling calculator is designed as a tool to be used with the BioCarbonFund, Winrock International Sourcebook for Land Use, Land Use Change, and Forestry Projects.[50]

At the 90% confidence and 2% error levels, after using our data and other reference information from this sourcebook, for the above ground biomass pool, we arrive at the results shown in the

[50] In sub-folder "Methodology and tools" within folder "1_MCF-PD and supporting info" please find the file Winrock_Sampling_Calculator_MCF-GHv1.xls showing the calculations performed on the Winrock Terrestial Sampling Calculator: Walker, S.M., Pearson, T., Brown, S. 2007, a tool to be used with the BioCarbonFund, Winrock International Sourcebook for Land Use, Land Use Change, and Forestry Projects a. Pearson, T., Walker, S.M., Brown, S., 2006.

following table, and will follow the most conservative recommendation, 48 PSPs distributed as shown in the middle column:

Table 17: Calculating the number of sample plots for aboveground carbon (Winrock Terrestrial Sampling Calculator)

Results - Aboveground Carbon - Number of plots to be used							
		Sourcebook for LULUCF Projects		AR-AM0001, AM0005, AM0006		AR-AM0003, AM0004, AM0007	
Stratum	Stratum Name	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity
Total Sample Size		38.99	**45**	39.12	**45**	38.99	**45**
stratum 1	montane cloud forest	17.28	**20**	17.34	**20**	17.28	**20**
stratum 2	premontane evergreen rain	6.18	**8**	6.20	**8**	6.18	**8**
stratum 3	coastal foothill evergreen moist	3.22	**4**	3.23	**4**	3.22	**4**
stratum 4	dry forest	4.51	**6**	4.52	**6**	4.51	**6**
stratum 5	dry forest	7.80	**9**	7.83	**10**	7.80	**9**
stratum 6							
stratum 7							
stratum 8							
stratum 9							
stratum 10							
TOTAL NUMBER OF PLOTS			**47**		**48**		**47**

For sampling the Soil Organic Carbon pool we will also follow the Winrock Terrestrial Sampling Calculator and arrive at the following results:

Table 18: Calculating the number of sample plots for soil carbon (Winrock Terrestrial Sampling Calculator)

Soil Carbon - Number of plots to be used							
		Sourcebook for LULUCF Projects		AR-AM0001, AM0005, AM0006		AR-AM0003, AM0004, AM0007	
Stratum	Stratum Name	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity	Plot Quantity	Rounded Plot Quantity
Total Sample Size		39.12	**45**	39.12	**45**	39.12	**45**
stratum 1	montane cloud forest	17.34	**20**	17.34	**20**	17.34	**20**
stratum 2	premontane evergreen rain	6.20	**8**	6.20	**8**	6.20	**8**
stratum 3	coastal foothill evergreen moist	3.23	**4**	3.23	**4**	3.23	**4**
stratum 4	dry forest	4.52	**6**	4.52	**6**	4.52	**6**
stratum 5	dry forest	7.83	**10**	7.83	**10**	7.83	**10**
stratum 6							
stratum 7							
stratum 8							
stratum 9							
stratum 10							
TOTAL NUMBER OF PLOTS			**48**		**48**		**48**

4. **Locating permanent sample plots –** The plots will be ad random located in each stratum to avoid subjective choice of plot locations. The plot locations will be identified with the help of a GPS device in the field. For each plot the geographic position (GPS coordinates of the plot center) will be recorded and archived. The PSPs will be established before the first monitoring takes place and measured for each monitoring event. In the case of special circumstances (e.g., forest fires, ex post sub-stratification) additional PSPs may be laid out.

4.3.5 Monitoring of project implementation: forest establishment and forest management

The project personnel shall monitor the implementation of the project through monitoring the:

- Boundary
- Forest establishment
- Forest management

The project monitoring team will monitor and record the boundaries of the project and all strata and substrata on which the reforestation project activity is undertaken over the crediting period. Sample plots will be installed in these substrata and strata throughout the project boundary.

A special aspect of monitoring the reforestation project activity is the variety of tree species being planted in eligible areas and requires particular attention. Changes in the sample plots of any strata and substrata will be recorded, including the areas of disturbance due to natural (e.g., fire and pests) and/or anthropogenic factors.

The project personnel shall ensure that the established plantations are protected over the crediting period. Firebreaks will be established in Stratum 5. In the case of fire and pests outbreak the stratum affected shall be recorded and mapped. Replanting of the areas should be done and

data recorded for each stratum. The factors affecting the carbon stock changes shall be monitored.

Monitoring project boundary

The monitoring of the project boundary (strata and substrata) will be done using direct ground truthing of every project polygon in the field with GPS. The project boundary will be thoroughly monitored yearly during the first 3 years. The geographical coordinates (latitude and longitude) of each corner of the parcel polygon are determined using GPS, collected and exported to the GIS software (ArcView). There they are further processed to generate monitoring maps of the actual project boundary including species and year planted.

From 2015 onwards, boundary will be monitored by observation. When these yearly field surveys (observational) are used to monitor the project boundary (strata and sub-strata), the existence and permanence of related permanent marks is controlled. During the crediting period the natural boundaries (e.g., rivers, valleys, roads, vegetation features) are used as reference, and where no natural boundary exists barbed wire fences on living fence posts have been established.

Any discrepancies between the area reported and the area estimated under the proposed reforestation project activity in any part of a strata and/or sub-strata shall be recorded and reported.

Monitoring forest establishment

Good practices of commonly accepted forest management will be implemented to ensure that planting practice and quality conforms to that described in the Project Description.

The following monitoring activities will be conducted as part of the forest establishment:

- Register the type of activities applied for site and soil preparation, and the area involved also ensuring a non-burning approach
- Register the planting activities: date, area, tree species, planting distance and area of stratum and/or sub-stratum.
- Document and explain any deviation from the planned forest establishment.
- Survival checking:
  - The survival rate of planted trees will be counted from year 1 to year 3 of the plantation. Re-planting shall be conducted within the next planting season, if the survival rate is lower than 80 percent of the final planting density.
  - The checking of the survival rate will be conducted when routine maintenance is carried out. Monitoring is done in temporary sample plots of 10x10 meters. As rule of a thumb a minimum of 10 plots per 100 ha (of the same stratum and/or sub-stratum) should be selected randomly.
    - In stratum 1 (51.4 ha): 5 plots
    - In stratum 2 (61.7 ha): 6 plots
    - In stratum 3 (44.5 ha): 4 plots
    - In stratum 4 (110 ha): 11 plots
    - In stratum 5 (116 ha): 12 plots
- Register and document the installation of firebreaks.
- Document and explain the use and amount of fertilizer used for the forest establishment.

Monitoring of forest management

Commonly accepted forest management techniques will be used by the project. The following practices will be monitored:

- Weeding: date, area, location (stratum and/or sub-stratum)
- Fertilizer application: date, location (stratum and/or sub-stratum), type and amount of fertilizer used, and reason for fertilization.

- Register disturbances: date, location (stratum and/or sub-stratum), GPS coordinates, area and type of disturbance.
- Confirm, check and document the information on forest protection practices such as firebreaks.
- The preparation of the plant sites has been done without any burning and so will the further maintenance and the remnant preparation of other sites be done without any burning. This exclusion of burning during the whole project period will be guaranteed by a variety of 'tools': (a) the general forest management pan, (b) the particular plantations management plans, (c) the regular visits of the technical team of the PP (very frequently during the first couple of years, till mid 2014; and two-yearly during the last 27 years) and (d) the monitoring visits by BOS+ or one of the actors of the monitoring network (yearly till 2016 and two-yearly afterwards).

4.3.6 Monitoring of GHG emissions and removals

As per the provisions of the baseline methodology selected, carbon stocks in deadwood and litter are not monitored.

GHG emissions by sources do not need to be monitored because they are not significant. According to the methodology AR-AMS0007 Version 01: The only increase in GHG emissions within the project boundary which results from the implementation of the A/R CDM project activity and which is required to be accounted for is the non-CO_2 GHG emission from burning of biomass for site preparation and/or forest management. Since there is no burning involved for site preparation, these emissions are **insignificant**. However, according to the CCB standard both emission from foccil fuels and N-fixiation species are to be taken into account and will be monitored as well. Monitoring anyway will make sure that this assumption for the exclusion made in the *ex ante* assessment will still hold in the ex post situation.

Therefore, changes in carbon stocks equal the carbon stock changes in above-ground, below-ground biomass and soil organic carbon within the project boundary.

$$\Delta C_{project} = \Delta C_{t} - \Delta C_{Baseline} - Leakage$$

Baseline net GHG removals by sinks

According to the methodology AR-AMS0007 Version 01, the carbon stock changes of the baseline net GHG removal by sinks are set to zero and do not need to be monitored over the project lifetime.

Leakage

The leakage represents the increase in GHG emissions by source that occurs outside the boundary of a reforestation project activity. Leakage is measurable and attributable to the reforestation project activity.
In the case of this reforestation project, according to the methodology AR-AMS0007 Version 01: The increase in GHG emissions due to displacement of pre-project grazing activities attributable to the A/R CDM project activity is **insignificant** because

The total area expected to be displaced is more than 5% of the entire A/R CDM project activity or more than 50 ha, and the n-a ha (where "n" is the area in ha expected to be displaced and "a" is 5% of the total project area or 50 ha) are displaced to:

Existing grasslands with the carrying capacity that allows for accommodation of the displaced animals during the entire period of displacement.

Since the application of the "Guidelines on conditions under which increase in GHG emissions related to displacement of pre-project grazing activities in A/R CDM project activity is insignificant" does lead to the conclusion that the applicable increase in GHG emissions is insignificant, then leakage from displacement of agricultural activities shouldn't be estimated.

However, as project monitoring will involve international university students it is foreseeable that considerable project emissions will be created as a result and should be monitored for. Records will be kept of all transport related to the project and their estimated emissions will be added to project buffer of non-saleable tCO2e. More details in section 3.2.

Actual net GHG removals by sinks/carbon pools:

1. ABOVE-GROUND AND BELOW-GROUND BIOMASS

Data will be taken and registered in an excel file.

MEASURING AND ESTIMATING CARBON STOCK AFTER ESTABLISHMENT

$$C= (V.D.BEF_2).(1+R).CF$$

With $V= DBH . H . F_f$

As recommended by the Good Practices Guide for LULUCF, if national or site specific ratios are available or have been developed they should be used to estimate volume and biomass. Due to the absence of species specific parameters (project and regional) for the Biomass Expansion Factor (BEF) and Root-to-shoot ratio (R) the project participants use default values from the Good Practices Guide LULUCF, 2003.

The BEF_2 given in Table 3A.1.10 of the GPG LULUCF represent averages with a range for average growing stock and age. The project participants use the BEF for the climate zone "Tropical Broadleaf" in the carbon model: 3.4 (2.0-9.0).

The R given in Table 3A.1.8 of the GPG LULUCF represent average values with a range for growing stock and age. The project participants use the R for "secondary tropical/subtropical forest" in the carbon model: 0.42 (0.14-0.83). And also Tropical/sub-tropical dry forest: 0.27.

Species specific values for the basic wood density will be applied to convert the volume to biomass as displayed in table 16 below.

Decisions regarding the use of mean values and standard deviations will be made following Annex 23 Guidelines on Conservative Choice and Application of Default Data in Estimation of the Net Anthropogenic GHG Removals by Sinks (Version 02).

Table 19: Basic wood density for a list of tree species

Scientific name	Family	Common name	Basic wood density (t d.m/m3)
Acacia macrocantha		Espino, faique	
Alnus nepalensis		Aliso	

Anona purpurea		Cabeza de negro	
Bactris gasipaes		Chontadura	
Borojoa patinoi		Borojó	0,52
Brosimmum utile		Sande	0,41: 0,46+
Brownea hertae		Clavellín	
Caesalpina spinosa		Guarango or Tara	1,05
Carapa guianensis		Tangaré	0,47
Castilla elastic		Caucho	
Casuarina equisetifolia		Casuarina	0,81
Cecropia sp		Guarumo	0,36
Cedrela montana		Cedro	0,40; 0,46+
Cedrela odorata		Cedro	0,40; 0,46+
Chysophyllum caimito		Caimito	
Clusia crenata		Sangre de Gallina	
Cordia alliadora		Laurel	0,48
Croton lechleri		Sangre de Drago	
Gliricidia sepium		Yuca de Ratón	
Hyeroina chocoensis		Mascarey	
Inga sp		Guabo	0,49; 0,52; 0,58; 0,64+
Iriiartea deltoid		Pambil	
Jacaranda copalba		Jacaranda	0,55
Juglans neotropica		Nogal	
Leucaena		Leucaena	0,64
Machura tinctoria		Moral fino	
Mammea Americana		Mamey	0,62
Melastomatacea sp		Colcas	
Ochroma pyramidale		Balsa	0,30
Psidium guajave		Guayaba	
Schinus molle		Molle	
Symphonia globulifera		Azufre	0,68
Sysygium malaccense		Pera de agua	
Tecoma stans		Cholán	
Trema integerrima		Sapán	
Trema micrantha		Sapán de paloma	
Triplaris cuminngiana		Fernán sánchez	0,56
Vismia obtuse		Sangre de gallina	0,41
		Manteca de Puerco	
		Guayacán Pechiche	
		Moral Bobo	

		Chíparo	
		Copal	
		Mambla	
		Jagua	

For species where specific basic wood densities could not yet be identified from the literature, data will be looked for during the project running and in case one would not find it, a conservative value of 0.3 will be applied.

MEASURING AND ESTIMATING CARBON STOCK CHANGES OVER TIME

The changes in the above-ground biomass and belowground biomass will be estimated using BEFs or allometric equations, depending on their availability. If no allometric equation is available for calculating volumes, volume calculations will be based on DBH and height measurement.

$\Delta C_{i,t2} = (C_{t2}-C_{t1})/(t2-t1)$

SOIL ORGANIC CARBON

Data will be taken and registered in an excel file (cfr annex x: soil carbon).

MEASURING AND ESTIMATING CARBON STOCK BEFORE ESTABLISHMENT OF TREES (BASELINE)

C = volume weight % C

MEASURING AND ESTIMATING CARBON STOCK CHANGES OVER TIME

$\Delta C_{i,t2} = (C_{t2}-C_{t1})/(t2-t1)$

Methodology

The determination of the carbon content will be based on the *Walkley & Black* method. This method is generally known and is often used as a reference for other methods with the same purpose (Schumacher, 2002). In brief, for the Walkley & Black method, the organic carbon is determined by the amount of dichromate consumed by the organic carbon. The amount of dichromate consumed is determined by a titration with an iron solution (Grobler et al, 1979). Advantages of this method are the low cost, limited time and number of instruments (Grobler et al, 1979; Schumacher, 2002).

In the laboratory, the following steps are required:

- Mix 1 gram of dry soil with an excess (10 ml) of K2Cr2O7; add 20 ml H2SO4 to the mix, shake and let it rest during half an hour;
- After that half hour, add another 150 ml of distilled water, 10 ml of H3PO4 85% and 1 ml of diphenylamine;
- Titrate the excess K2Cr2O7 which did not react with the organic matter. Use FeSO4 until there is a colour change from violet to green

This procedure should also be carried out “blank” without soil sample. The quantity of carbon in the sample can be calculated based on the added amount of dichromate. The overall chemical reaction is represented by the following formula (Schumacher, 2002):

$$2Cr_2O_7^{2-} + 3\,C + 16H^{+} = 4Cr^{3+} + 3CO_2 + 8H_2O$$

One has to remember that with this method not all carbon will be oxidized. Only 75% of the amount of carbon will be, on average, oxidized (Schumacher, 2002). The resulting quantity is therefore multiplied with a generally accepted factor of 4/3 to get the total carbon content (Vanhoof et al, 2006). Ultimately the percentage of carbon in the sample can be calculated with the following formula:

$$\frac{\text{g C}}{\text{g dry soil}}\,(\%) = 4 \times \frac{(a-b)}{a}$$

a = the quantity added to the blank ml $FeSO_4$
b = the amount added to the sample ml $FeSO_4$

By using the volume weight, the carbon sequestration (mass / volume) in the sample may be determined. The volume weight we define as follows:

$$\text{Volume weight} = \frac{\text{mass dry soil (g)}}{\text{volume soil sample } (\text{cm}^3)}$$

The carbon sequestration in each soil sample (g / cm ³) can be calculated by multiplying the volume weight with the carbon percentage. These values are then converted to carbon sequestration in soil volume (tonnes / ha) by starting from a soil depth that will be determined when doing the soil investigation.

4.3.7 Monitoring community aspects

The community/socio-economic monitoring plan will be meant to monitor the socio-economic parameters amongst the involved communities/actors within the project zone. The data generated by this plan will be used to monitor the social impacts, the changes that are caused by the project itself. The PP does realize that it is important to make difference between changes that would have taken place anyway and changes that are due to project activities and results. These parameters will be monitored and reported yearly during the years (2012) 2013-2014. Thereafter they will be monitored and reported every 4 years. The CCB standards will be followed as guidelines to elaborate a detailed community monitoring plan within 12 months after validation.

The community variables will be selected from two identified social groups: rural laborers from areas near project strata; members of the academic community (students and staff) of the local universities that will be invited to participate.There will be made a stakeholders selection in the population of the project zone, which will allow a (statistically) correct analysis of the data. Most data will be qualitative and will be withdrawn by questionnaires.

Since this project zone is not inhabited by indigenous/native communities and the population density (number of hamlets) overall is scarce, it might be better to focus on social impacts rather than on community impacts (in the strict sense of the word). It must be considered that the 13 participating properties are rural and scarcely populated. Only in strata 3, Rancho Suamox and 5, San Gerónimo, does the local population immediately abut project lands. These communities were consulted as documented in “Documentacion_Consulta_Comunitaria_CarbonNeg.docx” found in folder “Other Reference Materials”.

The monitoring plan will indicate in detail which communities and other stakeholders will be monitored, and identify the types of measurements, the sampling method, and the frequency of measurements. The "community groups" have been preliminarily defined in and off-site the project zone. This analysis will be done more in detail during the coming months. The PP will find out if all actors that might get impact from the project are incorporated in the further monitoring of the social impacts.

Hereafter impacts that will be monitored are briefly enumerated. A couple of corresponding questions will help start up the monitoring process:

1) Impact on the social and economic well-being of the involved communities living inside the project zone

- Are costs and benefits equitably shared among involved target groups during the project lifetime?
- Which indicators will be used to measure social and economic well-being within the project zone? What is the baseline?
- Which natural resources and ecosystem services are important for the people from the project area? (referring to High Conservation Values)
- Which indicators will be used to measure changes in natural resources and ecosystem services identified as important by the communities? What is the baseline?

2) Impact on the new communities of knowledge and sharing of information regarding the project

- How many students and professors from Belgium have visited Ecuador and for how long?
- How many students and professors from Ecuador have visited Belgium and for how long?
- Do the project participants have online access to project information regarding results and commercial realities regarding the payment of incentives?

3) Impact on the High Conservation Values of particular importance to the communities' well-being in the project zone

- Which High Conservation Values are of particular importance to the communities' well-being?
- Which indicators will be used to measure changes in these High Conservation Values?

3) Impact on the social and economic well-being of the involved communities living outside the project zone

- Which area will be considered as outside project zone?
- Which indicators will be used to measure social and economic well-being outside the project zone? What is the baseline?
- Does the project cause any negative impacts?
- If so, how does the project plan to mitigate these negative offsite social and economic impacts.

Answers on these questions will help to select the community variables to be monitored and the frequency of monitoring of any of these variables so that the full monitoring plan can be ready within twelve months of validation. This plan and the results of monitoring will be disseminated, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

Hereafter follows a preliminary list of socio-economic parameters that the PP considers to monitor:

1) Employment of local personnel in annual work-hours: number and wages
    a. Directly linked with the project
    b. Indirectly linked with the project (eco-tourism, …)
2) Income generation
    a. Directly linked with the project
    b. Indirectly linked with the project (eco-tourism, agroforestry, non-timber forest products, …)
3) Knowledge about
    a. Importance of forest and natural resources (flora, fauna, …)
    b. Ecosystem services: carbon retention, fire control, water, erosion control, biodiversity, ...
4) Skills (establishment and maintenance of forest plantations, application of organic fertilizers, organizing working teams, team work, …)
5) Citizenship (rights, laws and obligations about land tenure and land use, national and international policies about associated issues, pioneers in Ecuador, …)
6) Leadership (meetings,labor teams, ...)
7) Services (water and electricity) (the project is indirectly linked with the provision of these services – availability/quality/cost/ ...) as is part of HCV monitoring

4.3.8 Monitoring biodiversity

The CCB standards will be followed as guidelines to elaborate a detailed biodiversity monitoring plan within 1 year after project validation. Beside the more general standards tackling biodiversity aspects, as described in the general part of the CCB standards, monitoring will focus particularly on the standards of the biodiversity section.

The project monitoring plan will quantify bird species present in the project boundary over time and contribute to scientific understanding of the relation between bird populations and habitat quality. Annex 2 contains a list of the birds of particular conservation relevance. Project proponent has chosen to focus on the well known and representative avifauna as an indicator of the area's overall biological wealth. Different suites of bird species and their frequency in different areas serve as indicators of a habitat's relative well-being. Surveys of bird biodiversity prove to be particularly valuable: apart from their high intrinsic value and their value as essential ecosystem service providers, birds inhabiting forest habitats are extremely sensitive to forest loss and forest degradation and are therefore potential useful indicators for the impact of habitat and climate disturbances on biodiversity and environmental health (Aerts, R. et al.).[51] Most of the globally identified Key Biodiversity Areas, sites of importance for different species according to internationally agreed criteria, are Important Bird Areas (IBAs) [52,53], key sites for conservation of

[51] Aerts, Raf, Spranghers, Sarah, Verbist, Bruno, Lens, Luc, and Sekercioglu, Cagan. 2011. Bird surveys for REDD+: avian communities indicate forest degradation in a Peruvian coffee landscape. Available from Nature Precedings <http://dx.doi.org/10.1038/npre.2011.6589.1>

[52] Eken, G., Bennun, L., Brooks, T.M., Darwall, W., Fishpool, L.D.C., Foster, M., Knox, D., Langhammer, P., Matiku, P., Radford, E., Salaman, P., Sechrest, W., Smith, M.L., Spector, S., Tordoff, A. 2004. Key biodiversity areas as site conservation targets. *Bioscience* 54, 1110-1118.

[53] Langhammer, P.F., Bakarr, M.I., Bennun, L., Brooks, T.M., Clay, R.P., Darwall, W., De Silva, N., Edgar, G.J., Eken, G., Fishpool, L.D.C., da Fonseca, G.A.B., Foster, M.N., Knox, D.H., Matiku, P., Redford, E.A., Rodrigues, A.S.L.,

threatened, restricted range and/or migratory or congregatory bird species. Monitoring of avifauna populations and species diversity in project area will follow established field techniques and be supervised by Paul Greenfield, MCF founding member and recognized national expert.

Cooperation with research groups of universities in Belgium (Ghent University) and Ecuador is planned to monitor other species groups (especially invertebrates that react much faster to changes than birds) as well to get a more complete picture of biodiversity gains of this project. While specific baseline studies for each new target species or group of species have yet to be performed, large amounts of similar land in the project zone will remain to provide baseline information in future.

Monitoring will be executed in each of the project strata for the project area and a reference area in the project region.

In general further research and monitoring of biodiversity within the project zone, per stratum, will emphasize on:

- Comparison of plant diversity in intact natural vegetation and degraded vegetation (baseline)
- Evolution of plant diversity in degraded vegetation (project period)
- Avifauna trends (project period)
- Comparison of fauna diversity (after determining indicator species, also focusing on invertebrates) in intact natural vegetation and degraded vegetation (baseline) to provide a reference for biodiversity recuperation due to project activity.
- Evolution of fauna diversity (after determined indicator species) in degraded vegetation (project period)

Monitoring activities will naturally pay attention to HCVs as well, ensuring that HCVs present (as described in Table HCV.xls in Other Reference Materials folder) will be enhanced and maintained. For biodiversity this implies that special attention will be paid to the evolution in number of identified red list species. Project assumes that the planting of native tree species can only cause positive impacts on the High Conservation Values identified. However, this assumption will be tested during monitoring.

In the table in section 4.3.2 the timing of the monitoring activities is shown.

GOLD LEVEL EXCEPTIONAL BIODIVERSITY BENEFITS

This project will be monitored for the Gold Level Exceptional Biodiversity Benefits. Within this project zone is indeed a site of high biodiversity conservation priority. Please see Annex 1 CCB Compliance Key.

4.4 Organizational structure

4.4.1 Schematic presentation

The monitoring activity entails 4 main tiers with different actors responsible for each:

Salaman, P., Sechrest, W., Tordoff, A.W. 2007. Identification and Gap Analysis of Key Biodiversity Areas: Targets for Comprehensive Protected Area Systems (Best Practice Protected Area Guidelines). IUCN, Gland, Switzerland.

1) Coordination
2) Scientific input and output
3) Daily implementation and administration
4) Field assistance

The following table enumerates the actors involved:

Table 20: Actors involved in monitoring

	Project implementation and forest management	**Carbon**		**Community**	**Biodiversity**
		Biomass	**Soil**		
Final responsibility	BOS+ Flanders (VBV)				
Coordination	BOS+ tropics				
Scientific input and output	KUL	UGent	UGent	KUL	MCF
	Forestry dept of Northern Technical University in Ibarra (UTN)	KUL	KUL	Northern Technical University in Ibarra (UTN)	UGent
		(VITO)	(VITO)		Northern Technical University in Ibarra (UTN)
		Forestry dept of Northern Technical University in Ibarra (UTN)	PROMAS, University of Cuenca		
Daily implementation and administration	MCF				
Assistance in the field	MCF & Local owners and employees				

4.4.2 Actors involved: their responsibilities and competencies

BOS+
This is the Belgian association with final responsibility of the project, having signed the agreement with the main financing entity. This new organization is the result of the fusion of Groenhart vzw and the Association for Forests in Flanders, Belgium (VBV). Prior to this fusion, VBV's work was focused on forests in Flanders, Belgium, and they subcontracted their sister organization, Groenhart (BOS+ tropics))as project manager for work outside of the country. Now, BOS+ will be administrating the project, its implementation and its monitoring. BOS+ will be the central actor coordinating the monitoring process with other involved actors.

BOS+ tropics is a Belgian non-governmental organization for development co-operation that states that the natural resources of the South belong at first to the local population. BOS+ tropics finds it reasonable to stimulate processes that allow that population to use the advantages these natural resources offer, in an optimal and sustainable way.
BOS+ tropics is active with project management in South America: Bolivia, Ecuador, Peru and Chile. Its activities focus on forestry themes: forest preservation, sustainable management, restoration, forestation and reforestation.
BOS+ tropics, as administrator of the Flemish Fund for Tropical Forests, has cooperated with MCF since 2008, when MCF was granted 2 funds for developing the 2 different Project

Design Documents that are now bundled into one. In its updated form it is the basis for this project with multiple aims.
BOS+ tropics has experience with reforestation activities in the tropical context.
BOS+ tropics will be administrating the project, its implementation and its monitoring. BOS+ tropics will be the central actor coordinating the monitoring process with other involved actors.

- **Catholic University of Louvain, Belgium (KUL)**
  VBV and BOS+ tropen have very close contacts with the Faculty of Bio-engineering, Department of Forestry and Natural Sciences of the Catholic University of Louvain. A senior professor, with great experience in tropical forestry, climate change and biodiversity issues, Prof. Bart Muys, is president of VBV and a member of BOS+ tropen. He has been part of the project team of VBV since the beginning of this project and was involved in the negotiations and contract with the main financing entity.
  Prof. Muys is also coordinator of a well known academic consortium, named KLIMOS, which focuses on climate and development co-operation. Among other things they are doing case studies about the role of tropical forests within the theme of climate change and development.
  Master students might be interested to participate and document this project in a range of monitoring activities, within the framework of their thesis as Forestry engineer or within the KLIMOS network. There will be networked also with other departments of the KUL to check for thesis students with interest in community and biodiversity aspects.
  The set-up of the detailed monitoring plan and implementation, with specific attention for the themes indicated in the scheme above, will be discussed in detail with the KUL.

- **University of Ghent, Belgium (UGent)**
  As VBV and BOS+ tropen's offices are within the same building as the offices of the laboratory of forestry of the University of Ghent, there are daily contacts between VBV/BOS+ tropen and the university staff. The head of this forestry lab, Prof. Kris Verheyen, is vice-president of the VBV; and, he has closely followed the elaboration of this reforestation project. Within the faculty of bioscience engineering, there are close links and contacts with the laboratory of plant ecology where a couple of academics are busy doing applied research on amongst other issues (Tropical) forest ecosystem modeling and ecosystem carbon and water fluxes and their interactions. Dr. Engineer Hans Verbeeck is the suitable contact person. Their master students might be interested to participate and document this project in a range of monitoring activities, within the framework of their thesis. There will be networked also with other departments of the UGent to check for thesis students with interest in community and biodiversity aspects.
  The set-up of the detailed monitoring plan and implementation, with specific attention for the themes indicated in the scheme above, will be discussed in detail with the UGent.

- **Flemish Institute for Technological Investigation, Belgium (VITO)**
  VITO is a Flemish research institute with much expertise in environmental themes. There is amongst others the "Transition, energy and environment" research group. One of their specialties is an integrated approach to climate and land use. VBV and BOS+ tropen do have many contacts with researcher Engineer Dieter Cuypers. His current activities are concentrated on the interface of land use, forest ecosystems and climate change. He was the previous coordinator of BOS+ tropen and started up the projects with MCF while he was still working for BOS+ tropen. He is a member of the steering committee of VBV and was very involved in the elaboration of this reforestation project and the agreement between VBV and Telenet.
  The set-up of the detailed monitoring plan and implementation, with specific attention for the themes indicated in the scheme above, will be discussed in detail with VITO.
  Since VITO is a research institute with limited possibilities in supporting the project with students, priority will be given to abovementioned Flemish universities.

- **Northern Technical University, Ibarra, Ecuador (UTN)**
  Forestry and natural sciences units of Ecuadorian universities search for practical input into the curricula of their students. So does the Northern Technical University in Ibarra. Since there are good contacts between MCF, UTN and Ing. Leila López, it is quite realistic that project interns and thesis students will be willing to participate and help document different aspects of project activities. Engineer López is a graduate of this forestry school and was hired by MCF to co-author version 2 of this PDD. Also, Leila has helped establish contacts with Ing. Walter Palacios a faculty member of the forestry school who has already located 2 students with interest in participating in the project. The set-up of the detailed monitoring plan and implementation, with specific attention for the themes indicated in the scheme above, will be discussed in detail with the UTN.

- **Programa para el Manejo del Agua y del Suelo, University of Cuenca, Ecuador (PROMAS)**
  This unit of the University of Cuenca has great interest in this project, mainly in the soil and water management parts of it. The design of this reforestation activity, namely small-scale, mixed stands of native species, to evolve into a 'climax' natural forest, in Ecuador is a new approach to carbon capture projects. Academics of PROMAS share the interest to research impacts on soil (carbon mainly) and water, if possible, as a valuable commodity.
  BOS+ tropen and KUL have good contacts going back years with PROMAS, and BOS+ tropen has project activities in the working area of PROMAS, so that there have been frequent exchanges of information and experiences. Bio-engineers from the KUL and UGent cooperate with PROMAS on a very active basis with support of the Flemish Cooperation between Universities. The director of PROMAS, Dr. Felipe Cisneros, visits Belgian universities from time to time, and Belgian professors like Prof. Muys have visited PROMAS a couple of times to work together on certain themes.
  The set-up of the detailed monitoring plan and implementation, with specific attention for the themes indicated in the scheme above, will be discussed in detail with PROMAS.

- **MCF**
  Mindo Cloudforest Foundation is a legally established Ecuadorian conservation foundation, since 2001. The proposed reforestation project activity was designed and will be implemented by MCF utilizing locally available personnel and experienced staff. In coordination with project partner organization BOS+ tropen and the universities involved, MCF will participate in, record and archive all monitoring activities.

- **Ecopar**
  The Corporation for Investigation, Training and Technical Support for the Sustainable Management of Tropical Ecosystems, has provided technical services since the beginning of the project in 2008. They may also be involved in ongoing project monitoring with the provision of support staff or technical expertise in GIS, Soil Organic Carbon content or other aspects.

- **Local owners**
  Local land owners and future forest owners will be responsible as good "hosts" to monitor their plantations and the whole ecosystem, the social and economical context. They will be questioned by researchers/students about the project activities and their potential impacts. Their opinion does have high value. How and where they will be participating in the monitoring process will be prepared more in detail once the validation process has started up.

- **Local employees**
  Local people will be trained and employed to execute the planned monitoring activities. They will be contracted by MCF at appropriate times.

4.5 Quality Assurance and Quality Control (QA/QC)

The implementing organization MCF is managing the reforestation project on the field and will be responsible for the centralized documentation of all project planning and implementation. QA/QC procedures will be implemented and the use of these procedures monitored to ensure that net anthropogenic GHG removals by sinks are measured and monitored precisely, credibly, verifiably, and transparently. BOS+ tropen will coordinate QA/QC activities and are responsible for implementing and documenting these QA/QC procedures. BOS+ tropen will ensure that the QA/QC plan is developed and implemented.

The project will follow the IPCC Good Practices Guide recommendation of using two types of procedures in order to ensure that the inventory estimates and their contributing data are of high quality: Quality assurance (QA) and Quality control (QC).

The plan that describes specific QC / QA procedures will be presented in the following:
a) Good practices for data collection that will be established for all procedures such as: GIS analysis; field measurements; data entry; data documentation, and data storage.
b) Training courses will be held for all relevant personnel on all data collection and analysis procedures.
c) Steps will be taken to control for errors in the sampling and data analysis to develop a credible plan for measuring and monitoring carbon stock change in the project context. The same procedures shall be used during the project life cycle to ensure continuity.

4.5.1 Field data collection

The personnel involved in the measurement of carbon pools will be fully trained in field data collection and analysis. Good practices will be developed for each step of the field measurements and followed so that measurements are comparable over time. To verify that plots have been installed and the measurements taken correctly: A minimum of 10% of randomly selected plots will be re-measured by a supervisor with a team not involved in the initial measurement sampling. The re-measurement data will be compared with the original measurement data. Any errors found will be corrected and recorded.

The following quality targets will be achieved for the re-measurements, compared to the original measurements:

a) Missed or extra trees no error within the plot.
b) Tree species or groups no error.
c) D.B.H. < ± 0,1 cm or 1% whichever is greater
d) Height < ± 5%
e) Circular plot radius/sides of rectangular plot < ± 1% of horizontal (angle-adjusted)

4.5.2 Data entry

The proper entry of data is required to produce reliable carbon estimates. Therefore an entry form for all those data measured in the field required by the methodology will be used. All data sheets will include a “Data recorded by” field.
Communication between all personnel involved in measuring and analyzing data will be used to resolve any apparent anomalies before final analysis of the monitoring data can be completed. If there are any problems with the monitoring plot data that cannot be resolved, the plot will not be used in the analysis. Expert judgment and comparison with independent data will be used to ensure data results are in line with expectations. Additionally, field data will be reviewed further ensuring that the data and analysis are realistic.

4.5.3 Data maintenance and archiving

Due to the long timeframe of the project and the speed at which technology changes data archiving will be an essential component. Data will be archived in several forms and copies of all data will be provided to each project actor.

- Original copies of the field measurement (data sheets and electronic files) and laboratory data will be stored in a secure location.
- Copies of all data analysis and models, the final estimate of the amount of carbon sequestered, any GIS products, and the measuring and monitoring reports will be stored in a dedicated and safe place (preferably offsite).
- Electronic copies of all data and reports will be updated periodically and converted to any new format required by future software or hardware. A project participant involved in the field measurements will be assigned to implement this updating.
- During the project implementation and crediting period, all project documents will be archived in paper form at the in-home office of Brian Krohnke in Ibarra. Also, digital files with all project information will be backed up on Brian's external hard drive and periodically copied as a zip file onto Mindo Cloudforest Foundation's website server which is physically located in Chicago, Illinois, USA. As technologies continue to evolve, MCF will determine a secure and efficient strategy to maintain these documents for no less than 2 years beyond the end of the project crediting period.
- Moreover all documents are also provided at BOS+ tropen in Belgium. There they are saved on an internal server that is backed up weekly and then monthly onto an external hard disk. All data are printed as well and archived.

4.5.4 Uncertainty assessment

The major sources of uncertainties related to changes in the carbon stock in the living biomass pool include: natural factors such as fire and pest outbreaks; stand variables such as variation in the yield tables, allometric equations, biomass expansion factors (BEFs), wood density, and carbon fraction; and the errors contributed by the measurement.

In general there is a strong relationship between sampling design and uncertainty estimates. Good practice requires the monitoring to be accurate. Monitoring schemes should neither "over-estimate" nor "under-estimate", as far as can be judged.

Uncertainties will be reduced as far as practicable. Uncertainty information is not intended to dispute the validity of the monitoring estimates, but is assessed to help prioritize efforts to improve the accuracy in the future and guide decisions on methodological choice. The project will follow the IPCC Good Practices Guide on the assessment of uncertainty. Uncertainty in inventories arises through at least three different processes:

- Uncertainties from definitions
- Uncertainties from natural variability of the processes
- Uncertainties resulting from the assessment of the process or quantity: (i.) Measuring, (ii.) Sampling, (iii.) Reference data, (iv.) Expert judgment

4.6 Procedures for handling internal auditing and non-conformities

If external supervisors encounter errors while reviewing the 10% of monitoring data (cfr section 4.5.1), any errors found will be corrected and recorded. The necessary follow-up training and/or disciplinary measures will be given to the personnel identified.

5 ENVIRONMENTAL IMPACT

The project activity will have zero negative environmental impacts and reforestation on private lands does not require environmental impact studies in Ecuador. Project work areas are significantly degraded, and establishing plantations of native tree species will bring only positive environmental impacts corollary to the other various ecosystem services provided by new forests. Project plan does include the use of < 8% casuarinas (*Casuarina equisetifolia*), an exotic species present in the region for decades which has been proven to be non-invasive and of great value in the establishment of wind-breaks in the harsh conditions of Salinas parish. Also project will use < 2% *Alnus nepalensis,* an exotic species present in project area and highly valued for its rapid growth and ability to shade-out aggressive, non-native grasses.

6 STAKEHOLDER COMMENTS

Mindo Cloudforest Foundation owns and operates three bird sanctuaries totaling 330 hectares in the immediate vicinity of project strata 1-3. Also, as is the case with project developer, MCF members own other forest properties in the area for a total of some 960 hectares. We mention this because in a very real sense MCF and its members are stakeholders and community members in the project area, taken in the larger, general sense of the word.

In a straight line, the area of strata 1-3 is roughly 100 kilometers southwest of strata 4-5, where project developer has long-term friendships with various land-owners and conservationists. MCF has also given avitourism guide training courses in nearby Lita, Imbabura, Mr. Krohnke has lived in nearby Ibarra for the past 13 years. Again, this in an endogenous project born of these experiences and has been discussed in detail with local environmental activists, leaders and all project participants, and each participating landowner was interviewed as a step in the pre-selection process.

The project has also been formally presented to the Sub-secretariat for Climate Change of the Ministry of Environment. This relation has been at the level of informal conversations since 2009 and more recently in 2011 in formal meetings with Carola Borja Osorio, Under-secretary for Climate Change. At different points the project has also been presented to and discussed with the Municipality of Ibarra, the Parish Board (Junta Parroquial) of Salinas parish, the Director of Environment and Tourism of the Municipality of San Miguel de Los Bancos, Municipal Council representatives from Canton Puerto Quito and various other functionaries.

Summary of comments received during process:

1. “Who wouldn´t want to improve their property with trees, help get more green in this area.”
2. “Our haciendas already produce economically, our interest in this project is strictly ecological recuperation. When we were kids there were parrots and sometimes monkeys down near the house. That was a long time ago.”
3. “I hope someday to build a small ecotourism hotel and need help recreating a little jungle.”
4. “Twenty years is a long time, but my children will have a new opportunity with the land.”
5. “I hope this protects my property from invasions [squatters]”.
6. “We had to sell our few cows to cover some debts, and now the land produces nothing.”
7. “It´s good that there will be some paying jobs for a few years. Right now there is next to nothing available and everybody goes to Ibarra, Quito or leaves Ecuador to find work”.
8. “We want to plant native species that we know will grow here, not introduced things”.
9. “Salinas used to have a lot of forest, but with the construction of the sugar mill in the nineteen-sixties, everybody cleared their land to plant cane.”

10. We are interested in seeing a Verified Carbon Standard project carried out and validated in Ecuador, and we want to include that kind of project in our national registry of climate change mitigation projects.

As MCF continues to work and its members continue to live in and around the project areas, community and project participant comments will be duly registered and responded to in the most appropriate manner and on a case by case basis.

More information regarding community input is found in the folder" Other Reference Materials" file name: Documentacion_Consulta_Comunitaria_CarbonNeg.docx

ANNEX 1 CCB Standards Compliance Key

Gen	Clim	Comm	Bio
G1.	**Required**		

Original Conditions in the Project Area

General Information

1. The location of the project and basic physical parameters (e.g., soil, geology, climate).

--This is described in section **1.1 Summary Description of the Project**; in section **1.9 Project Location**; and section **1.10 Conditions Prior to Project Initiation**.

2. The types and condition of vegetation within the project area.

--Also described in section **1.10 Conditions Prior to Project Initiation**.

3. The boundaries of the project area and the project zone.

--The project zone is presented in maps in section **1.9 Project Location**. Then in section **2.3 Project Boundary** the project Area (as specifically defined as the area where the project activity is realized) is presented as precision eligible polygon maps created using remote sensors.

Climate Information

4. Current carbon stocks within the project area(s), using stratification by land-use or vegetation type and methods of carbon calculation (such as biomass plots, formulae, default values) from the Intergovernmental Panel on Climate Change's 2006 Guidelines for National GHG Inventories for Agriculture, Forestry and Other Land Use (IPCC 2006 GL for AFOLU) or a more robust and detailed methodology.

--Following methodology AR-AMS0007 / Version 01.0.1, project has calculated baseline carbon stocks for the two pools affected by the project activity, the Living Biomass and Soil Organic Carbon pools. This estimation is described in section **3. Quantification of GHG Emissions Reductions and Removals**.

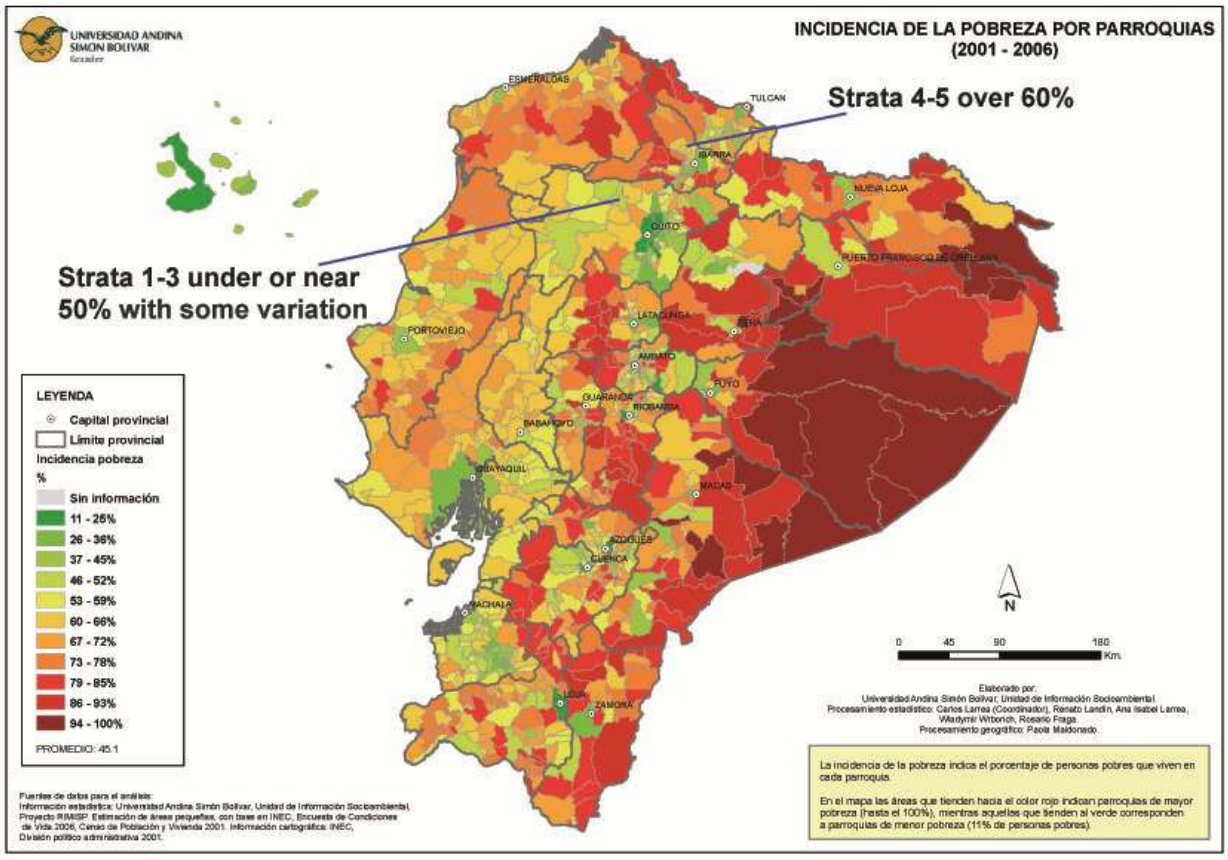
Community Information

5. A description of communities located in the project zone, including basic socio-economic and cultural information that describes the social, economic and cultural diversity within communities (wealth, gender, age, ethnicity etc.), identifies specific groups such as Indigenous Peoples and describes any community characteristics.

-- These issues are treated in section **1.10 Conditions Prior to Project Initiation** with additional information here:

The project zone does not include identified Indigenous Peoples communities or high percentages of indigenous residents (see pdf file “PORCENTAJE POBLACION INDIGENA” in folder “Other Reference Materials”). However, both Salinas and La Carolina parishes home to our strata 4-5 respectively, hold high percentages of Afro-Ecuadorian people who have historically, analyzing various economic and social development indicators, been second to last after the indigenous in Ecuador in development terms. (Please see map “Porcentaje poblacion afro parroquias 2001.pdf” and “MÁS ALLÁ DE LOS PROMEDIOS: Afrodescendientes en América Latina LOS AFROECUATORIANOS” Juan Ponce Editoras: Josefina Stubbs y Hiska N. Reyes in folder “Other Reference Materials”.)

In contrast, the towns near project strata 1-3 are largely comprised of colonists from other regions of Ecuador, mostly of mixed ancestral origin, ‘mestizos’. While nearly all rural areas of Ecuador have high levels of poverty, there is a great difference between our project strata 1-3 in Pichincha province on the one hand and strata 4-5 on the other.



There is some evidence that poverty indices have been improving in the period since 2006 (see website “La pobreza en Ecuador se redujo 3,64% en el último año, según cifras oficiales ANDES” saved in folder “Other Reference Materials”). However, in the rural setting poverty levels at or above 50% are still palpable throughout the project area.

6. A description of current land use and customary and legal property rights including community property in the project zone, identifying any ongoing or unresolved conflicts or disputes and identifying and describing any disputes over land tenure that were resolved during the last ten years (see also G5).

-- The current land use has been described in the **PDD section 1.10**

--There is no community property in the project boundary or immediate area of influence. Project has not identified any disputes over land tenure amongst its participating land-owners. Care was taken during pre-selection of participants to work only with people who have clear land title. This is objectively demonstrated by certificates from the relevant property registries and/or municipal tax rolls and was reviewed during the field visit by the Rainforest Alliance auditors.

This was also verified during community meetings documented in the folder Other Reference Materials file name: Documentacion_Consulta_Comunitaria_CarbonNeg.docx

Biodiversity Information

7. A description of current biodiversity within the project zone (diversity of species and ecosystems) and threats to that biodiversity, using appropriate methodologies, substantiated where possible with appropriate reference material.

A description of the project objectives concerning biodiversity can be found in **1.1 Summary Description of the Project.** A description of biodiversity for the different strata is discussed in**1.10 Conditions Prior to Project Initiation**.

Threats to biodiversity in the project zone are further habitat degradation and fragmentation, both of which will be countered by the project activity.

When non-forest related red list species would be encountered, adecuate measures will be taken to ensure sufficient habitat is present. 8. An evaluation of whether the project zone includes any of the following High Conservation Values (HCVs) and a description of the qualifying attributes:

Points 8 through 8.6 are summarized in the matrix “Table_HCV.xlsx” found in the folder Other Reference Materials. This information was collected from documentary review, community consultation and expert or knowledgeable judgment. The “Guia para la identificación y manejo de bosques de alto valor de conservación en Ecuador, 2005, Alianza Jatun Sacha – CDC Ecuador, Carlos Carrera Reyes, Angel Jácome Mena, Armando Chamorro Rosero y David Thomas was used as a guideline. The standout HCVs identified by the PP are the project zone’s outstanding avifauna which is documented in Annex 2 of this Project Description.

8.1. Globally, regionally or nationally significant concentrations of biodiversity values;

a. protected areas:
b. threatened species:
c. endemic species:
d. areas that support significant concentrations of a species during any time in their lifecycle (e.g. migrations, feeding grounds, breeding areas).

8.2. Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance;

8.3. Threatened or rare ecosystems;

8.4. Areas that provide critical ecosystem services (e.g., hydrological services, erosion control, fire control);

8.5. Areas that are fundamental for meeting the basic needs of local communities (e.g., for essential food, fuel, fodder, medicines or building materials without readily available alternatives); and:

8.6. Areas that are critical for the traditional cultural identity of communities (e.g., areas of cultural, ecological, economic or religious significance identified in collaboration with the communities).

Gen	Clim	Comm	Bio
G2.		**Required**	

Baseline Projection

The project proponents must develop a defensible and well-documented 'without-project' reference scenario that must:

1. Describe the most likely land-use scenario in the absence of the project following IPCC 2006 GL for AFOLU or a more robust and detailed methodology, describing the range of potential land use scenarios and the associated drivers of GHG emissions and justifying why the land-use scenario selected is most likely.

--Demonstrated in section **2.4 Baseline Scenario**.

2. Document that project benefits would not have occurred in the absence of the project, explaining how existing laws or regulations would likely affect land use and justifying that the benefits being claimed by the project are truly 'additional' and would be unlikely to occur without the project.

--Demonstrated and explained in section **2.4 Baseline Scenario** and barrier analysis in section **2.5 Additionality.**

3. Calculate the estimated carbon stock changes associated with the 'without project' reference scenario described above. This requires estimation of carbon stocks for each of the land-use classes of concern and a definition of the carbon pools included, among the classes defined in the IPCC 2006 GL for AFOLU. The timeframe for this analysis can be either the project lifetime (see G3) or the project GHG accounting period, whichever is more appropriate.

--Following methodology AR-AMS0007 / Version 01.0.1, project has determined that the without-project scenario would produce a negative evolution of carbon stocks in project boundary, and this is conservatively estimated as zero or flat baseline carbon stocks, **2.4 Baseline Scenario** and **3.1 Baseline Emissions**.

4. Describe how the 'without project' reference scenario would affect communities in the project zone, including the impact of likely changes in water, soil and other locally important ecosystem services.

-- Regarding Ecosystem services, the without-project scenario would produce ever greater degradation of soils and watersheds, lowering the availability of these important resources. Furthermore erosion and thus the availability of productive land would further decrease. Other ESS were not identified as relevant for the project zone communities. An overview is presented by stratum in tables 4 and 6.

Moreover, the increase in income opportunities, which are few, especially in Stratum 4 and 5 offered by the project would be missed, together with its beneficial side effects and positive spillover in the community.

Since the project lands consist of degraded grasslands, at best allowing very extensive grazing with diminishing density, possible income from the productive activities would decrease without the project.

5. Describe how the 'without project' reference scenario would affect biodiversity in the project zone (e.g., habitat availability, landscape connectivity and threatened species).

-- The mosaic of scattered remnant forest and degraded areas is the consequence of the vast deforestation rates in earlier decades. The natural habitats have been decreased in quantity and quality, and the same can be said about the landscape connectivity; the scattered remnants of natural vegetation are not guaranteed to stay connected by corridors to other areas of natural vegetation, so that habitats are getting smaller. The surveys of birds that areas with more intact patches of natural vegetation are ,and richer in birdlife (number of species) thus implying that restoring this type of habitats will increase biodiversity in the project zone.

-- Without the Project and the support and incentives it provides for reforestation, this zone will in large part degrade further, lead to desertification in 2 strata and would endanger IUCN Red List species of concern. Moreover deforestation will result in significant landscape level fragmentation limiting species interchange along this 'rich' area. Impacts to the buffer zones of the IBA's will be substantial and negative. The predicted further degradation to occur in the baseline scenario will in all likelihood not encompass the entire project zone, but the fragmentation, reduction in patch size, and additional livestock pressure will have profoundly deleterious effects on the entire zone.

-- Natural regeneration has not been able to get through in the project zone. In stratum 4, the desert like arid grasslands show vegetation adapted to its specific conditions. This vegetation needs to be monitored together with its fauna for biodiversity parameters to make sure present species will not disappear because of project activity. Although deforestation began more than 50 years ago, nowhere within the project zone natural regeneration process can be seen to lead to climax vegetation.

-- There have been some **experiments of reforestation** within the project zone. These efforts have been made by some land owners (Rafael Ferro, Grecia Flores and Brian Krohnke) with the help of volunteers. The results of these efforts unfortunately are rather poor; in most cases the trees are overgrown by the dominating grasses. It might be concluded that restoring the natural vegetation is difficult and demanding (physically and financially) and the technical support this project provides is necessary to reforest.

Gen	Clim	Comm	Bio
G3.	**Required**		

Project Design and Goals

The project must be described in sufficient detail so that a third-party can adequately evaluate it. Projects must be designed to minimize risks to the expected climate, community and biodiversity benefits and to maintain those benefits beyond the life of the project. Effective local participation in project design and implementation is key to optimizing multiple benefits, equitably and sustainably. Projects that operate in a transparent manner build confidence with stakeholders and outside parties and enable them to contribute more effectively to the project.

1. Provide a summary of the project's major climate, community and biodiversity objectives.

--Found in section **1.1 Summary Description of the Project**.

2. Describe each project activity with expected climate, community and biodiversity impacts and its relevance to achieving the project's objectives.

--Found in section **1.8 Description of the Project Activity**.

3. Provide a map identifying the project location and boundaries of the project area(s), where the project activities will occur, of the project zone and of additional surrounding locations that are predicted to be impacted by project activities (e.g. through leakage).

--Described and shown in section **1.9 Project Location** and in section **2.3 Project Boundary**.

4. Define the project lifetime and GHG accounting period and explain and justify any differences between them. Define an implementation schedule, indicating key dates and milestones in the project's development.

--Found in section 1.5 **Project Start Date** November 1st, 2011 and in **1.6 Project Crediting Period:** 20 year renewable crediting period beginning November 1st, 2011 and ending October 31st, 2031. *The period from June, 2011 through October preparations will be done for the plantations.*

Section **4.2 Monitoring plan in general** gives a chronogram of major project activities and also their monitoring.

Also see PGMF_CarbonNeg_MAYO.docx in folder Other Reference Materials.

5. Identify likely natural and human-induced risks to the expected climate, community and biodiversity benefits during the project lifetime and outline measures adopted to mitigate these risks.

--In stratum 5 there is some risk of damage to project plantations from fire. Project workers will create 6 meter firebreaks around plantation areas and will also seek support from adjacent fire and police stations. There has also been, coincidentally, a building social awareness and pressure against the use of fire as a land management tool in this area.

In stratum 3 there is some risk of abusive neighbors allowing their cattle to enter project lands, and property owner has already begun strengthening his fences and project proponent has discussed the issue with neighbors during community meetings documented in Documentacion_Consulta_Comunitaria_CarbonNeg.docx found in folder "Other Reference Materials".

6. Demonstrate that the project design includes specific measures to ensure the maintenance or enhancement of the high conservation value attributes identified in G1 consistent with the precautionary principle.

--Although HCVs are limited in our project zone measures will be taken to protect and enhance them. Clearly, the project activity of native and mixed species forest plantations replacing grasslands comprised of non-native grasses enhance habitat for the high conservation values identified in **G1**.

As the forests will be managed as natural forests and, except for 3 owners (see details in "PGMF_CarbonNeg_Mayo.docx" included in folder Other Reference Materials) who will selectively and sustainably log their forests after 20 years according to the FSC standards, no logging will occur and high conservation values will be enhanced thanks to the project activity.

The nature of the project, restoring natural forest vegetation will enhance ecosystem services identified as being valuable to local people (**1.10**).

Once forests are established regular maintenance and the obligation of the land owner to secure its limits will also serve as a measure for protection of the forest and its related HCV's.

During monitoring activities, both of community and biodiversity aspects, HCVs will be an explicit factor (**4.3.7 and 4.3.8**).

7. Describe the measures that will be taken to maintain and enhance the climate, community and biodiversity benefits beyond the project lifetime.

--Many project participants have indicated their desire to maintain the forests created by the project on a permanent basis, beyond the project lifetime. Others have indicated their desire to eventually selectively harvest some of the trees grown. Project will encourage these participants to view their forests as something that can be managed sustainably with selective harvests. Over the first 20 years of project, when no extraction is allowed, participatory, sustainable management plans will be developed with project participants. This has been elaborated more extensively in the document "PGMF_CarbonNeg_MAYO.docx" in the folder Other Reference Materials.

As specialists in birding and eco-tourism, PP will use the ongoing relations with the various owners and the development of management and sustainability plans as an opportunity to encourage and foster the implementation of tourism alternatives as a means to generate tangible income from the forests without destroying them.

8. Document and defend how communities and other stakeholders potentially affected by the project activities have been identified and have been involved in project design through effective consultation, particularly with a view to optimizing community and stakeholder benefits, respecting local customs and values and maintaining high conservation values. Project developers must document stakeholder dialogues and indicate if and how the project proposal was revised based on such input. A plan must be developed to continue communication and consultation between project managers and all community groups about the project and its impacts to facilitate adaptive management throughout the life of the project.

-- Documentacion_Consulta_Comunitaria_CarbonNeg.docx found in folder "Other Reference Materials".

9. Describe what specific steps have been taken, and communications methods used, to publicize the CCBA public comment period to communities and other stakeholders and to facilitate their submission of comments to CCBA. Project proponents must play an active role in distributing key project documents to affected communities and stakeholders and hold widely publicized information meetings in relevant local or regional languages.

--Project developer will communicate this information at beginning of public comment period, via personal phone calls and emails with the participating landowners and also via the MCF website www.mindocloudforest.org,

10. Formalize a clear process for handling unresolved conflicts and grievances that arise during project planning and implementation. The project design must include a process for hearing, responding to and resolving community and other stakeholder grievances within a reasonable time period. This grievance process must be publicized to communities and other stakeholders and must be managed by a third party or mediator to prevent any conflict of interest. Project management must attempt to resolve all reasonable grievances raised, and provide a written response to grievances within 30 days. Grievances and project responses must be documented.

-- This process consists of two steps, the first acting as a filter for the second:

1. Any grievances that arise will first be discussed personally within the project personnel, and directly with the person bringing the complaint. An attempt will be made to come to a 'gentlemen's agreement' whenever possible.

For any situation that is not immediately amenable to resolution and agreement as described in #1 project will recommend that the complaining or aggrieved party take their issue to either the corresponding local political officer or Parish Board (Intendente Político or Junta Parroquial), as these structures already exist as the nearest form of government and the administration of justice in Ecuador. 11. Demonstrate that financial mechanisms adopted, including projected revenues from emissions reductions and other sources, are likely to provide an adequate flow of funds for project implementation and to achieve the anticipated climate, community and biodiversity benefits.

--This project has contracts for full-funding for first 20 years of project from project partner BOS+ tropen, subcontracted by **Association for Forests in Flanders, Belgium (VBV**) who in turn has signed a contract with Belgian telecommunications company Telenet. Also, since 2010 project developer has received much smaller contributions from USA company Roastery 7, and project scope has been designed precisely to match these funding sources.

See chapter "8. Plan de Negocios" in PGMF_CarbonNeg_MAYO.docx in folder Other Reference Materials. In this statement of project income and expenses the financial sustainability of the initiative is demonstrated with a conservative estimate of project income generating a 2% surplus.

Gen	Clim	Comm	Bio
G4.	**Required**		

Management Capacity and Best Practices

The success of a project depends upon the competence of the implementing management team. Projects that include a significant capacity-building (training, skill building, etc.) component are more likely to sustain the positive outcomes generated by the project and have them replicated elsewhere. Best practices for project management include: local stakeholder employment, worker rights, worker safety and a clear process for handling grievances.

The project proponents must:

1. Identify a single project proponent which is responsible for the project's design and implementation. If multiple organizations or individuals are involved in the project's development and implementation the governance structure, roles and responsibilities of each of the organizations or individuals involved must also be described.

--In Ecuador, Mindo Cloudforest Foundation and Project Director, Brian Krohnke, are responsible for all aspects of project design and implementation. In section **4.4 Organizational Structure** there is a complete description of the different roles and responsibilities of the partner organizations.

Also, in Table 1 of the risk analysis done following the AFOLU Non-Permanence Risk Tool: VCS Version 3 a clear demonstration of the different project partners' experience and competencies is given.

2. Document key technical skills that will be required to implement the project successfully, including community engagement, biodiversity assessment and carbon measurement and monitoring skills. Document the management team's expertise and prior experience implementing land management projects at the scale of this project. If relevant experience is lacking, the proponents must either demonstrate how other organizations will be partnered with to support the project or have a recruitment strategy to fill the gaps.

--Also described in section **4.4 Organizational Structure**. Once the monitoring plan will be elaborated in more detail the needed skills will be documented and distributed amongst the actors involved.

3. Include a plan to provide orientation and training for the project's employees and relevant people from the communities with an objective of building locally useful skills and knowledge to increase local participation in project implementation. These capacity building efforts should target a wide range of people in the communities, including minority and underrepresented groups. Identify how training will be passed on to new workers when there is staff turnover, so that local capacity will not be lost.

--Project training focuses on three aspects for all employees during verbal training events:

1. Forestry techniques
    a. Correct usage and maintenance of project tools.
    b. In-field class as to correct location, determination of species according to specific forestry model, hole-digging, placement of amendments and planting.
    c. Creation of firebreaks where relevant.
    d. Plant-crown maintenance.
2. Employee rights and responsibilities.
    a. All employees explained the breakdown of the components of their wages (IESS, 13th salary, 14th salary, vacation days).
    b. Emergency procedures.
    c. Procedures in event of labor dispute or non-conformity.
3. Climate Change susceptibility.

a. Verbal description of the thought process and market segment that makes the project possible.

b. Basics as to the reality of global climate change

c. Brief analysis and discussion of susceptibility issues in the particular stratum where the workers live and work.

For practical purposes this started with a small group in stratum 5 who then became trainers of the additional workers that joined in the second month. In the other strata the work groups were smaller and training sessions involved all employees.

In folder Other Reference Materials see “Photo registry of training events.doc”.

Continuing with the aspect #1 training in forestry techniques, beginning summer months of 2012, project will install simple but modern and efficient nursery at the family home and farm of crew leader Gerardo Cuasapaz. Gerardo, his wife Blanca Cuasquer and Rosa Cuascota (all MCF employees) will be trained in all matters regarding the germination and transplanting of seeds and management skills necessary to create quality plants for the project on a carefully constructed time and workflow plan.

Another area in which this project shows great potential for capacity building is via the relations to be constructed with students and staff of the Northern Technical University who will be consulted and invited to participate in all aspects of project implementation. This creation of connectivity with the Belgian universities Louvain and Ghent will create growing opportunities for information interchanges, internships and further study. When different studies or elements of the monitoring procedures require training, it will be done accordingly.

4. Show that people from the communities will be given an equal opportunity to fill all employment positions (including management) if the job requirements are met. Project proponents must explain how employees will be selected for positions and where relevant, must indicate how local community members, including women and other potentially underrepresented groups, will be given a fair chance to fill positions for which they can be trained.

--Currently the project has sub-contracted nursery production of trees by networking and discovering local competencies. The subcontractors are all residents of the project areas:

- Ángel Suco, Pedro Peñafiel and Ricardo Espinales in strata 1-2
- Juan Barba, Ángel Suco and Rafael Ferro in stratum 3
- Carlos José Enríquez, stratum 4
- Rocío Grijalva, stratum 5

Otherwise, since September, 2011 the project has hired a full-time Forestry Engineer, Luis Ortiz Cruz who has a lengthy resumé after 30+ years of forestry work in different regions of Ecuador. This position was filled after placing classified ads in local newspapers, networking and interviewing several potential candidates. In 2009 when we hired a Forestry Engineer to help write the second version of the PDD we also published ads in the local papers. Of 24 applicants, the top 4 were interviewed in person and the most qualified was hired, Ing. Leila López. These examples show the project´s openness and lack of gender bias. (Project developer has the CVs of the top four applicants mentioned on file and available for inspection.)

All other employees, laborers, come from the project region and while mostly male, represent persons of different ethnic backgrounds: mestizos, afro-Ecuadorians, indigenous Ecuadorians and even the project director has dual-citizenship, USA and Ecuador.

5. Submit a list of all relevant laws and regulations covering worker's rights in the host country. Describe how the project will inform workers about their rights. Provide assurance that the project meets or exceeds all applicable laws and/or regulations covering worker rights and, where relevant, demonstrate how compliance is achieved.

--In the folder "Other Reference Materials" please find the Ecuadorian Labor Code (Código de Trabajo).

All project personnel, Director, Forestry Engineer and laborers will I have their rights explained to them verbally and also be given reference information for learning more about their rights on the internet. This is to include their inscription in the Ecuadorian Institute of Social Security from the first day of their employment, objectively demonstrated by an "Entrance Notification" (Aviso de Entrada). Also, monthly payroll receipts will indicate to staff the makeup and percentage components of their salaries, vacation pay, additional (13^{th} and 14^{th}) salaries, etc.

Moreover this information will also be passed during the training that will we be given in each community before the project implementation.

6. Comprehensively assess situations and occupations that pose a substantial risk to worker safety. A plan must be in place to inform workers of risks and to explain how to minimize such risks. Where worker safety cannot be guaranteed, project proponents must show how the risks will be minimized using best work practices.

--Reforestation field work by definition includes some heavy lifting and tough physical labor. Project will urge workers to use their best judgment to avoid dangerous situations and will rely on years of experience in rural Ecuador to proceed with solid common sense. Also, for project strata 1-3 there are hospitals with emergency services in both Nanegalito and Pedro Vicente Maldonado, never more than 1 hour from project work areas. For project strata 4-5 high quality medical services are available in Ibarra, 30 minutes from work areas in stratum 4 and 1 hour from stratum 5. By Ecuadorian law, workers and citizens receive free treatment at public hospitals.

7. Document the financial health of the implementing organization(s) to demonstrate that financial resources budgeted will be adequate to implement the project.

--Mindo Cloudforest Foundation has no long-term debt and substantial net worth. On following pages our balance and profit and loss statements through December, 2011. Also an analysis of the resources committed to the project and project expenditures is found in chapter 8 of the Adaptive General Forest Management Plan (document in Spanish included as Annex 4 of the current Project Description).

Also, the project thanks to partners BOS+ tropen and VBV in Belgium has the backing of Telenet, the leading Belgian telecommunications company with considerable resources already committed to the project and formidable communications ability within Belgium to help generate more interest in the project and locate further support going forward.

MINDO CLOUDFOREST FOUNDATION			
BALANCE GENERAL			
AL 31 DE DICIEMBRE DEL 2011			
ACTIVOS			
ACTIVO CORRIENTE			**54,019.37**
EFECTIVO Y EQUIVALENTES AL EFECTIVO		**42,587.57**	
Caja Administrador	324.87		
Caja Milpe	273.13		
Caja Silanche	25.00		
Banco Pichincha Cta. 3455694604	276.86		
Banco Pichincha Cta. 3493216304	41,687.71		
CUENTAS Y DOCUMENTOS POR COBRAR			
Cuentas por cobrar		**863.57**	
Impuestos Anticipados		**4,969.63**	
IVA en compras	1,339.03		
IVA Credito Tributario	3,630.60		
INVENTARIOS		**5,598.60**	
Inventario de libros	5,598.60		
ACTIVO NO CORRIENTE			**427,681.71**
ACTIVOS INTANGIBLES		**6,312.14**	
Marcas y patentes, sitios web	6,219.43		
Amortiza. Acum. Marcas y patentes	-93.89		
PAGINA WEB		**186.60**	
www.mindocloudforest.org	119.40		
www.mcf.ec	67.20		
PROPIEDAD PLANTA Y EQUIPO		**414,361.57**	
Terreno Milpe	218,707.43		
Terreno Rio Silanche	79,456.35		
Terrenos Reserva Oreothraupis	65,009.74		
Edifiaciones Milpe	56,856.43		
Deprec. Acum. Edificios	-8,803.04		
Equipo de oficina y enseres	1,721.97		
Deprec. Acum. Oficina y enseres	-651.38		
Computador, GPS, software	3,693.30		
Depre. Acum,Equipo de Computo	-3,148.37		
Herremientas de campo	1,583.58		
Depre. Acum.Herramientas	-64.44		
ACTIVOS BIOLOGICOS		**7,008.00**	
Acacia Mangium	220.50		
Plantación de café en Silanche	6,760.00		
Insumos	27.50		
TOTAL ACTIVOS			**481,701.08**

PASIVOS			
PASIVO CORRIENTE			**27,488.21**
PROVEEDORES NACIONALES		**20,480.45**	
Cuentas por pagar	20,480.45		
OBLIGACIONES PERSONAL		**3,595.54**	
Aporte patronal	2,031.90		
Aporte individual	1,563.64		
IMPUESTOS POR PAGAR SRI		**1,032.22**	
10% Imp. Rte. Honorarios	321.43		
1% Otras Retenciones Aplicables	288.62		
30% Retencion IVA Bienes	5.40		
70% Retención IVA Servicios	31.05		
100% Retencion IVA	385.72		
PROVISIONES		**2,380.00**	
Decimo Tercer Sueldo	1,303.00		
Decimo cuarto	792.00		
IESS por pagar	750.00		
Vacaciones por pagar	327.00		
TOTAL PASIVOS			**27,488.21**
PATRIMONIO			**454,212.87**
CAPITAL SOCIOS		**250.00**	
Iain Douglas Campbell	50.00		
Paul Joseph Greenfield	50.00		
Juan Fernando Veintimilla	50.00		
Brian Krohnke	50.00		
Jozef Hendriks	50.00		
DONACIONES		**448,904.07**	
Donaciones Internacionales	437,838.61		
Revalorizacion de activos	11,065.46		
RESULTADOS DE OPERACIÓN		**-5,058.80**	
Deficit acumulado años anteriores	-17,578.59		
Superavit del ejercicio	12,519.79		
TOTAL PASIVOS + PATRIMONIO			**481,701.08**

MINDO CLOUDFOREST FOUNDATION					
BALANCE DE PERDIDASY GANANCIAS					
AL 31 DE DICIEMBRE DEL 2011					
INGRESOS					
	INGRESOS OPERACIONALES				**52,954.56**
	Ventas Milpe	7,294.84			
	Ventas Silanche	718.86			
	Ventas Carboneg	3,943.52			
	Ventas café	197.34			
	Ingresos por consultoria MINTUR	40,800.00			
	INGRESOS NO OPERACIONALES				**149,865.14**
	Ingresos Proyecto Belgica	143,775.38			
	Ventas de Libros Aves	4,377.00			
	Venta de camisetas y otros	712.76			
	Ingresos Donaciones Nacionales	1,000.00			
		TOTAL INGRESOS			**202,819.70**
GASTOS					**190,299.91**
	GASTOS ADMINISTRATIVOS			**81,719.90**	
		GASTOS DE PERSONAL	**23,582.34**		
		Sueldos	10,882.08		
		Aporte Patronal	3,531.90		
		Decimo Tercero	1,242.70		
		Decimo Cuarto	792.00		
		Vacaciones	978.22		
		Fondos de Reserva	754.00		
		Bonificaciones	5,401.44		
		HONORARIOS PROFESIONALES	**29,089.92**		
		Honorarios Brian Krohnke	8,440.53		
		Honorarios Paul Joseph	9,000.00		
		Honorarios Ian Douglas	4,500.00		
		Honorarios Campos Cecibel	945.75		
		Honorarios Molina & Compañía	6,203.64		

GASTOS GENERALES ADMINISTRATIVOS		**29,047.64**		
Publicidad	805.50			
Modificacion y adecuacion edificaciones	13,590.00			
Jornales trabajadores	380.00			
Servicios encomiendas	60.00			
Servicios varios	569.00			
Servicios Contabilidad	2,420.00			
Energia Electrica y Agua	676.96			
Suministros de oficina	386.51			
Suministros y materiales de limpieza	569.00			
Mantenimiento y accesorios	500.00			
Gastos de movilización	1,366.70			
Correos	251.00			
Combustible y lubricantes	380.00			
Internet	1,852.00			
Servicios bancarios	349.28			
Impuestos municipales	1,393.90			
Alimentacion	700.00			
Multas IESS	350.00			
Multas SRI	89.25			
Otros costos	119.70			
Otros gastos	2,238.84			
GASTOS PROYECTOS			**108,580.01**	
GASTOS PROYECTO CARBONEG		**5,010.83**		
Materiales	689.20			
Servicios ocacionales	4,321.63			
GASTOS PROYECTO BELGICA		**103,569.18**		
Mano de obra	37,736.75			
Plantas Forestales	31,667.00			
Materiales	9,580.29			
Insumos Hidrogel	9,375.00			
Sueldos	6,835.47			
Pagos de retenciones e IESS	7,470.75			
Pagos trans y viaticos	672.00			
Varios	231.92			
TOTAL GASTOS				**190,299.91**
SUPERAVIT DEL EJERCICIO				**12,519.79**

Gen	Clim	Comm	Bio
G5.	**Required**		

Legal Status and Property Rights

The project must be based on a solid legal framework (e.g., appropriate contracts are in place) and the project must satisfy applicable planning and regulatory requirements.

During the project design phase, the project proponents should communicate early on with relevant local, regional and national authorities in order to allow adequate time to earn necessary approvals. The project design should be sufficiently flexible to accommodate potential modifications that may arise as a result of this process.

In the event of unresolved disputes over tenure or use rights to land or resources in the project zone, the project should demonstrate how it will help to bring them to resolution so that there are no unresolved disputes by the start of the project.

Based on information about current property rights provided in G1, the project proponents must:

1. Submit a list of all relevant national and local laws and regulations in the host country and all applicable international treaties and agreements. Provide assurance that the project will comply with these and, where relevant, demonstrate how compliance is achieved.

"Marco legal e institucional forestal.docx" found in folder Other Reference Materials. It is the professional opinion of MCF legal counsel, Dr. César Molina, that we have complied with all relevant laws and are legally permitted to do this type of work by statute approved by the Ecuadorian Ministry of Environment.

2. Document that the project has approval from the appropriate authorities, including the established formal and/or traditional authorities customarily required by the communities.

Please see Section 1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks.

3. Demonstrate with documented consultations and agreements that the project will not encroach uninvited on private property, community property, or government property and has obtained the free, prior, and informed consent of those whose rights will be affected by the project.

-- The project is executed on private land only and contracts with all the owners have been signed. Each of these private properties has its own road access.

4. Demonstrate that the project does not require the involuntary relocation of people or of the activities important for the livelihoods and culture of the communities. If any relocation of habitation or activities is undertaken within the terms of an agreement, the project proponents must demonstrate that the agreement was made with the free, prior, and informed consent of those concerned and includes provisions for just and fair compensation.

--Project can demonstrate the agreements signed with each participating landowner where there is no mention of relocation of anybody as this will not occur as a result of this small-scale project on private properties in agreement with the owners.

5. Identify any illegal activities that could affect the project's climate, community or biodiversity impacts (e.g., logging) taking place in the project zone and describe how the project will help to reduce these activities so that project benefits are not derived from illegal activities.

--The only project activity is the cultivation of forest plantations. Poaching or illegal logging of project trees will be guarded against by each participating landowner, all of which have clearly demarcated property boundaries and fences where relevant and necessary. In the case any illegal event becomes known to project proponent, the project will help with the necessary legal complaint and will archive copies of such documentation.

6. Demonstrate that the project proponents have clear, uncontested title to the carbon rights, or provide legal documentation demonstrating that the project is undertaken on behalf of the carbon owners with their full consent. Where local or national conditions preclude clear title to the carbon rights at the time of validation against the Standards, the project proponents must provide evidence that their ownership of carbon rights is likely to be established before they enter into any transactions concerning the project's carbon assets.

--Currently, project funders don't have any plans to transact 'carbon credits' or VCUs of any nature. The voluntary heart of this project resides in project funders' desire to explain to their clients how they have 'neutralized' their emissions voluntarily.

Net Positive Climate Impacts

The project must generate net positive impacts on atmospheric concentrations of greenhouse gases (GHGs) over the project lifetime from land use changes within the project boundaries.

The project proponents must:

1. Estimate the net change in carbon stocks due to the project activities using the methods of calculation, formulae and default values of the IPCC 2006 GL for AFOLU or using a more robust and detailed methodology. The net change is equal to carbon stock changes *with* the project minus carbon stock changes *without* the project (the latter having been estimated in G2). This estimate must be based on clearly defined and defendable assumptions about how project activities will alter GHG emissions or carbon stocks over the duration of the project or the project GHG accounting period.

--See **section 3 Quantification of GHG Emission Reductions and Removals**.

2. Estimate the net change in the emissions of non-CO2 GHG emissions such as CH4 and N2O in the *with* and *without* project scenarios if those gases are likely to account for more than a 5% increase or decrease (in terms of CO2-equivalent) of the project's overall GHG emissions reductions or removals over each monitoring period.

-- **See section 3.2 Project Emissions**

3. Estimate any other GHG emissions resulting from project activities. Emissions sources include, but are not limited to, emissions from biomass burning during site preparation, emissions from fossil fuel combustion, direct emissions from the use of synthetic fertilizers, and emissions from the decomposition of N-fixing species.

--See **section 3.2 Project Emissions**

4. Demonstrate that the net climate impact of the project is positive. The net climate impact of the project is the net change in carbon stocks plus net change in non-CO2 GHGs where appropriate minus any other GHG emissions resulting from project activities minus any likely project-related unmitigated negative offsite climate impacts (see CL2.3).

--See **section 3 Quantification of GHG Emission Reductions and Removals**.

5. Specify how double counting of GHG emissions reductions or removals will be avoided, particularly for offsets sold on the voluntary market and generated in a country with an emissions cap.

--Ecuador has no emissions cap. Contractual obligations with project funders guarantee them all carbon rights to the project, so that there can be no double counting or reselling. And as explained in **G5.6** funders´ only intention with these ´rights´ is purely notional and non-market oriented.

Gen	Clim	Comm	Bio
CL2.		**Required**	

Offsite Climate Impacts ('Leakage')

The project proponents must quantify and mitigate increased GHG emissions that occur beyond the project area and are caused by project activities (commonly referred to as 'leakage').

The project proponents must:

1. Determine the types of leakage that are expected and estimate potential offsite increases in GHGs (increases in emissions or decreases in sequestration) due to project activities. Where relevant, define and justify where leakage is most likely to take place.

--See **section 3.3 Leakage**. Following approved methodology and companion tools, it has been determined that leakage is insignificant and to be counted as zero.

2. Document how any leakage will be mitigated and estimate the extent to which such impacts will be reduced by these mitigation activities.

--No leakage mitigation activities are planned as leakage is determined insignificant.

3. Subtract any likely project-related unmitigated negative offsite climate impacts from the climate benefits being claimed by the project and demonstrate that this has been included in the evaluation of net climate impact of the project (as calculated in CL1.4).

--See above.

4. Non-CO2 gases must be included if they are likely to account for more than a 5% increase or decrease (in terms of CO2-equivalent) of the net change calculations (above) of the project's overall off-site GHG emissions reductions or removals over each monitoring period.

-- Estimated at lower than 5% but will be subject of monitoring, details in **section 3.2**

Gen	Clim	Comm	Bio
CL3.	**Required**		

Climate Impact Monitoring

Before a project begins, the project proponents must have an initial monitoring plan in place to quantify and document changes (within and outside the project boundaries) in project-related carbon pools, project emissions, and non-CO2 GHG emissions if appropriate. The monitoring plan must identify the types of measurements, the sampling method, and the frequency of measurement. Since developing a full monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being validated against the Standards. This is acceptable as long as there is an explicit commitment to develop and implement a monitoring plan.

The project proponents must:

1. Develop an initial plan for selecting carbon pools and non-CO2 GHGs to be monitored, and determine the frequency of monitoring. Potential pools include aboveground biomass, litter, deadwood, belowground biomass, wood products, soil carbon and peat. Pools to monitor must include any pools expected to decrease as a result of project activities, including those in the region outside the project boundaries resulting from all types of leakage identified in CL2. A plan must be in place to continue leakage monitoring for at least five years after all activity displacement or other leakage causing activity has taken place. Individual GHG sources may be considered 'insignificant' and do not have to be accounted for if *together* such omitted decreases in carbon pools and increases in GHG emissions amount to less than 5% of the total CO2-equivalent benefits generated by the project. Non-CO2 gases must be included if they are likely to account for more than 5% (in terms of CO2-equivalent) of the project's overall GHG impact over each monitoring period. Direct field measurements using scientifically robust sampling must be used to measure more significant elements of the project's carbon stocks. Other data must be suitable to the project site and specific forest type.

--See **section 4 Monitoring**.

2. Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

--Project has committed to developing a full monitoring plan. See **section 4 Monitoring.**

Net Positive Community Impacts

The project must generate net positive impacts on the social and economic well-being of communities and ensure that costs and benefits are equitably shared among community members and constituent groups during the project lifetime.

Projects must maintain or enhance the High Conservation Values (identified in G1) in the project zone that are of particular importance to the communities' well-being.

The project proponents must:

1. Use appropriate methodologies to estimate the impacts on communities, including all constituent socio-economic or cultural groups such as indigenous peoples (defined in G1), resulting from planned project activities. A credible estimate of impacts must include changes in community well-being due to project activities and an evaluation of the impacts by the affected groups. This estimate must be based on clearly defined and defendable assumptions about how project activities will alter social and economic well-being, including potential impacts of changes in natural resources and ecosystem services identified as important by the communities (including water and soil resources), over the duration of the project. The 'with project' scenario must then be compared with the 'without project' scenario of social and economic well-being in the absence of the project (completed in G2). The difference (i.e., the community benefit) must be positive for all community groups.

-- See **section 4.3.7**

2. Demonstrate that no High Conservation Values identified in G1.8.4-642 will be negatively affected by the project.

--On the contrary, we hypothesis that project biodiversity monitoring will show that High Conservation Values are positively impacted by project.

Offsite Stakeholder Impacts

The project proponents must evaluate and mitigate any possible social and economic impacts that could result in the decreased social and economic well-being of the main stakeholders living outside the project zone resulting from project activities. Project activities should at least 'do no harm' to the well-being of offsite stakeholders.

The project proponents must:

1. Identify any potential negative offsite stakeholder impacts that the project activities are likely to cause.

--None identified. Project takes place on 13 different private land areas, and will employ more people than are currently employed on these lands.

2. Describe how the project plans to mitigate these negative offsite social and economic impacts.

--Not relevant. However, if negative impacts would be identified, project will adapt to mitigate them.

3. Demonstrate that the project is not likely to result in net negative impacts on the well-being of other stakeholder groups.

--Project lands are but a small percentage of total lands of similar land-use characteristics in the region. No negative impacts will be experienced.

Community Impact Monitoring

The project proponents must have an initial monitoring plan to quantify and document changes in social and economic well-being resulting from the project activities (for communities and other stakeholders). The monitoring plan must indicate which communities and other stakeholders will be monitored, and identify the types of measurements, the sampling method, and the frequency of measurement. Since developing a full community monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being validated against the Standards. This is acceptable as long as there is an explicit commitment to develop and implement a monitoring plan.

The project proponents must:

1. Develop an initial plan for selecting community variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's community development objectives and to anticipated impacts (positive and negative).

-- **See section 4.3.7**.

2. Develop an initial plan for how they will assess the effectiveness of measures used to maintain or enhance High Conservation Values related to community well-being (G1.8.4-6) present in the project zone.

-- Since no High Conservation Values related to community wellbeing were identified in the project zone, this is not a part of the monitoring plan.

3. Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

--Project is committed to doing this. A basis has been described in **section 4.3.7**

Gen	Clim	Comm	Bio
B1. **Required**			

Net Positive Biodiversity Impacts

The project must generate net positive impacts on biodiversity within the project zone and within the project lifetime, measured against the baseline conditions. The project should maintain or enhance any High Conservation Values (identified in G1) present in the project zone that are of importance in conserving globally, regionally or nationally significant biodiversity. Invasive species populations must not increase as a result of the project, either through direct use or indirectly as a result of project activities.

Projects may not use genetically modified organisms (GMOs) to generate GHG emissions reductions or removals. GMOs raise unresolved ethical, scientific and socio-economic issues. For example, some GMO attributes may result in invasive genes or species.

The project proponents must:

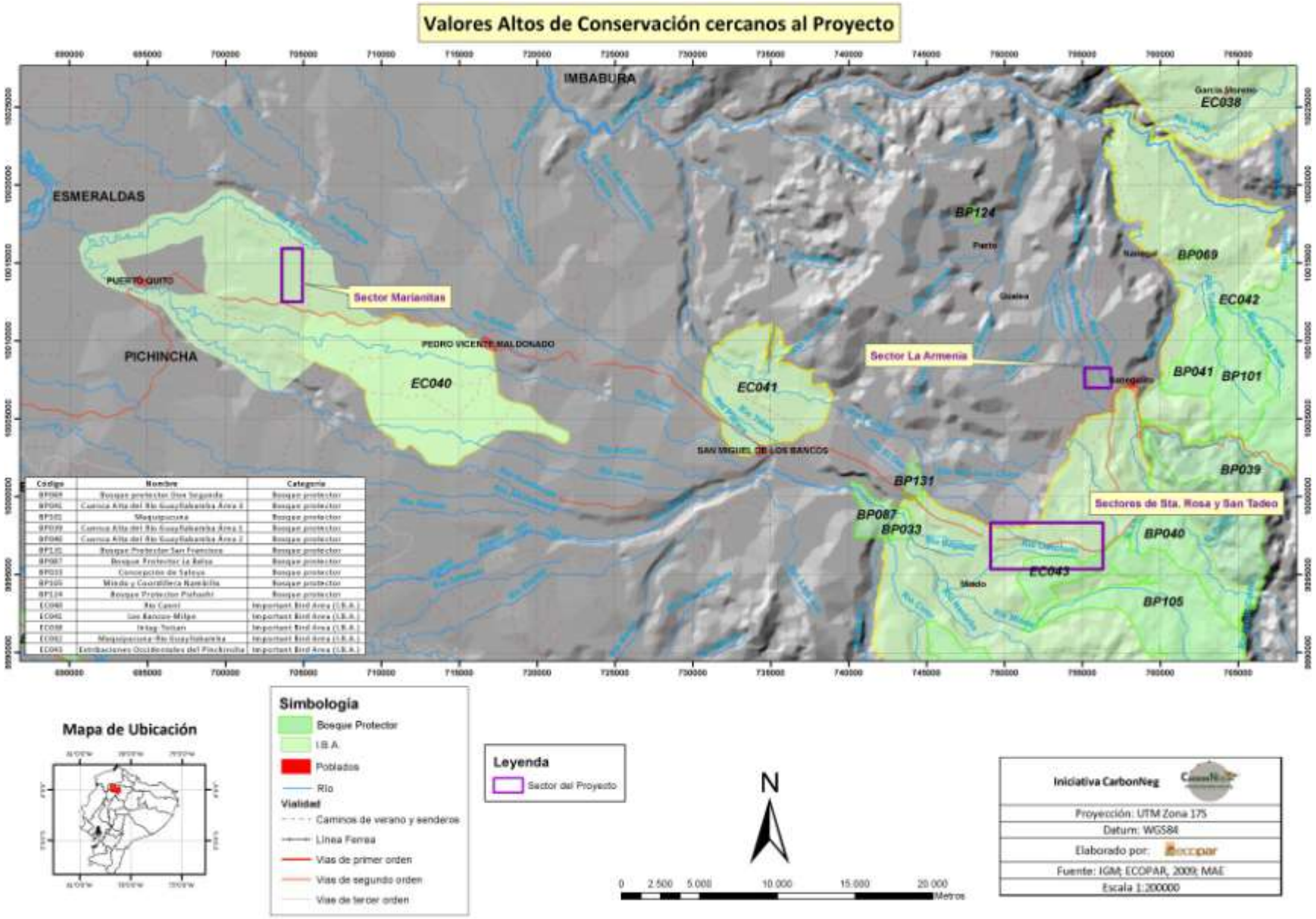
1. Use appropriate methodologies to estimate changes in biodiversity as a result of the project in the project zone and in the project lifetime. This estimate must be based on clearly defined and defendable assumptions. The 'with project' scenario should then be compared with the baseline 'without project' biodiversity scenario completed in G2. The difference (i.e., the net biodiversity benefit) must be positive.

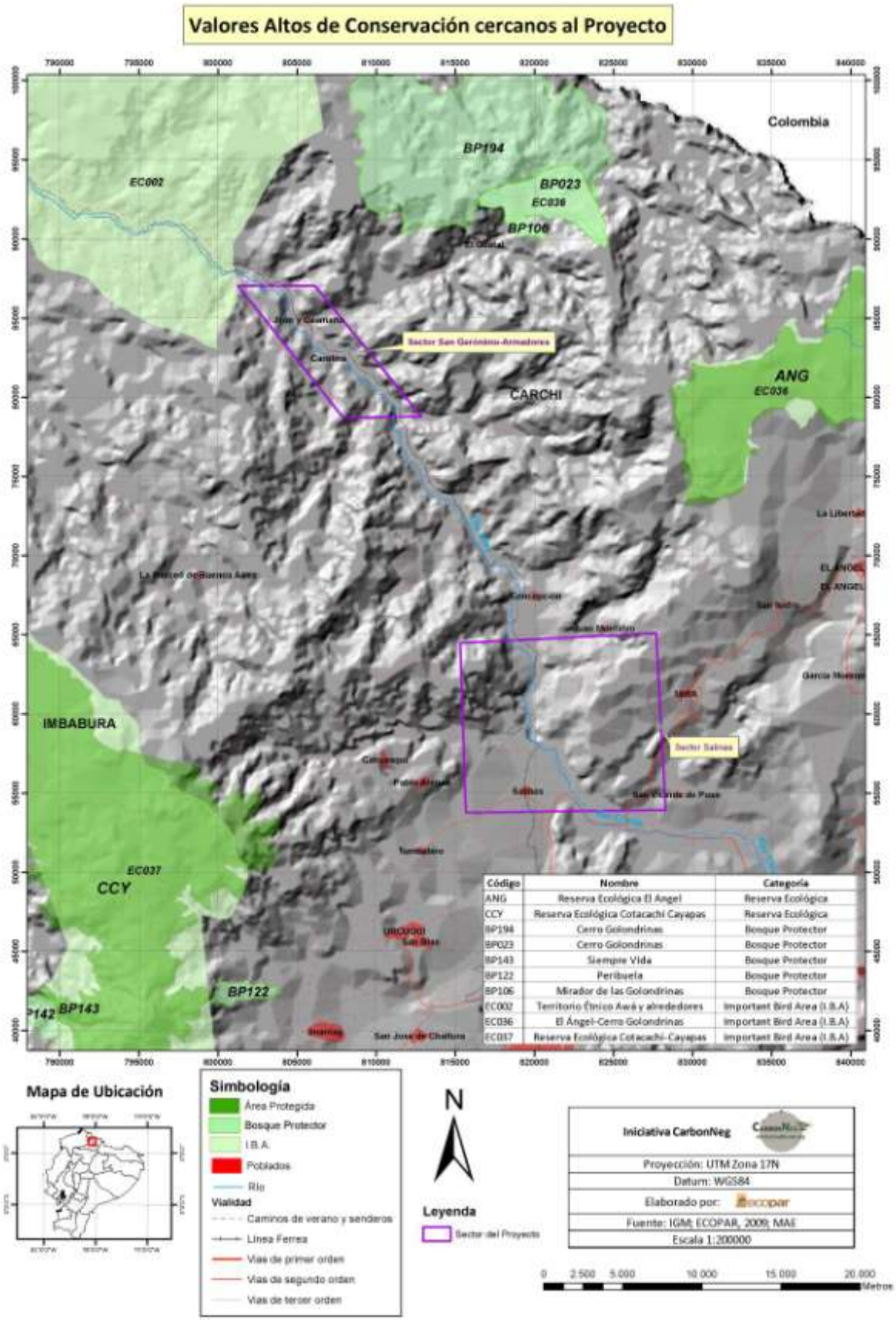
-- A basic Biodiversity Monitoring Plan has been described in **section 4.3.8** and a detailed monitoring plan for this will be developed within six-months of project start date.

2. Demonstrate that no High Conservation Values identified in G1.8.1-348 will be negatively affected by the project.

-- Described in more detail in **section 4.3.8.**

Also we reproduce here an identification of HCV forests in and near to the project zone as identified in Table_HCV.xls and elsewhere:


Valores Altos de Conservación cercanos al Proyecto
IMBABURA
ESMERALDAS
PICHINCHA
PUERTO QUITO
PEDRO VICENTE MALDONADO
SAN MIGUEL DE LOS BANCOS
Sector Marianitas
Sector La Armenia
Sectores de Sta. Rosa y San Tadeo
EC038
EC042
EC040
EC041
EC043
BP124
BP069
BP041
BP101
BP039
BP131
BP087
BP033
BP040
BP105
Mapa de Ubicación
Simbología
Bosque Protector
I.B.A.
Poblados
Río
Vialidad
Caminos de verano y senderos
Línea Ferrea
Vías de primer orden
Vías de segundo orden
Vías de tercer orden
Leyenda
Sector del Proyecto
N
0 2.500 5.000 10.000 15.000 20.000
Metros
Iniciativa CarbonNeg
Proyección: UTM Zona 17S
Datum: WGS84
Elaborado por: ecopar
Fuente: IGM; ECOPAR, 2009; MAE
Escala 1:200000



Código	Nombre	Categoría
ANG	Reserva Ecológica El Angel	Reserva Ecológica
CCY	Reserva Ecológica Cotacachi Cayapas	Reserva Ecológica
BP194	Cerro Golondrinas	Bosque Protector
BP023	Cerro Golondrinas	Bosque Protector
BP143	Siempre Vida	Bosque Protector
BP122	Peribuela	Bosque Protector
BP106	Mirador de las Golondrinas	Bosque Protector
EC002	Territorio Étnico Awá y alrededores	Important Bird Area (I.B.A)
EC036	El Ángel-Cerro Golondrinas	Important Bird Area (I.B.A)
EC037	Reserva Ecológica Cotacachi-Cayapas	Important Bird Area (I.B.A)

3.

Identify all species to be used by the project and show that no known invasive species will be introduced into any area affected by the project and that the population of any invasive species will not increase as a result of the project.

--Please see Annex 4. The two non-native species that will be used by project (14% of total) are already present in project area and have not become invasive and help to establish a forest ecosystem.

4. Describe possible adverse effects of non-native species used by the project on the region's environment, including impacts on native species and disease introduction or facilitation. Project proponents must justify any use of non-native species over native species.

--The use of casuarinas to create wind-blocks is a common practice in much of the Ecuadorian Sierra and they help create micro-climates that allow other, native species to become established and grow. Project has decided to use *Alnus nepalense*, because anecdotal evidence and local experience have shown that locally more prevalent *Alnus acuminata* has been suffering fungal attack in recent years and also several nurseries and local experts have reported their inability to find viable seeds for this second alder species.

5. Guarantee that no GMOs will be used to generate GHG emissions reductions or removals.

--Project will not use any GMOs, and in fact GMOs are prohibited by the Ecuadorian constitution of 2008.

Offsite Biodiversity Impacts

The project proponents must evaluate and mitigate likely negative impacts on biodiversity outside the project zone resulting from project activities.

1. Identify potential negative offsite biodiversity impacts that the project is likely to cause.

--None expected. Project includes only one activity, reforestation with native species on degraded terrains, and common sense dictates no negative impact offsite. According to approved methodology, leakage is expected to be insignificant.

2. Document how the project plans to mitigate these negative offsite biodiversity impacts.

--Not relevant. However, if during project monitoring negative impacts are observed, PP commits to take all necessary measures to mitigate these.

3. Evaluate likely unmitigated negative offsite biodiversity impacts against the biodiversity benefits of the project within the project boundaries. Justify and demonstrate that the net effect of the project on biodiversity is positive.

--If there are no negative biodiversity impacts, clearly the net effect is positive.

Gen	Clim	Comm	Bio
B3. **Required**			

Biodiversity Impact Monitoring

The project proponents must have an initial monitoring plan to quantify and document the changes in biodiversity resulting from the project activities (within and outside the project boundaries). The monitoring plan must identify the types of measurements, the sampling method, and the frequency of measurement. Since developing a full biodiversity-monitoring plan can be costly, it is accepted that some of the plan details may not be fully defined at the design stage, when projects are being validated against the Standards. This is acceptable as long as there is an explicit commitment to develop and implement a monitoring plan.

The project proponents must:

1. Develop an initial plan for selecting biodiversity variables to be monitored and the frequency of monitoring and reporting to ensure that monitoring variables are directly linked to the project's biodiversity objectives and to anticipated impacts (positive and negative).

--Total bird lists from inventories in all strata.

--Particularly High Conservation Value species mentioned in optional Standard GL3 below.

-- For other species a monitoring plan, including a baseline study is to be developed within 12 months after validation. See details in **section 4.3.8.**

2. Develop an initial plan for assessing the effectiveness of measures used to maintain or enhance High Conservation Values related to globally, regionally or nationally significant biodiversity (**G1.8.1-3)** present in the project zone.

--Project developer, MCF, its different members and colleagues, have years of birding reports and sighting data, forming a reliable baseline, especially for strata 1-3. Also, project participant Rafael Ferro, has been very active since 2007 in the *Grupo de Apoyo Local* (Local Support Group) of the Río Caoní IBA. One result of this is another bird-list of sightings that also provides us with baseline information for stratum 3.

During project design stage in 2009 and follow up visits in 2010-2011, project developer has created a basic birdlist for strata 4-5, and this list has since been reviewed and improved by recognized expert and authority on the Ecuadorian avifauna, Paul Greenfield.

While we have not developed the specific monitoring plan for this, the idea is simple: more native forests in strata 4-5 will lead to the presence of more bird species. Also greater forest connectivity in strata 1-3 will help assure long-term and more distributed presence of the species identified as High Conservation Values.

In the most basic sense, project monitoring for this standard will include the performance of point counts and the establishment of monitoring transects in relevant areas of the project boundary, and the keeping of annual avifauna census data for each strata.

3. Commit to developing a full monitoring plan within six months of the project start date or within twelve months of validation against the Standards and to disseminate this plan and the results of monitoring, ensuring that they are made publicly available on the internet and are communicated to the communities and other stakeholders.

--This plan will be developed, a basic plan has been described in **section 4.3.8**.

Gen	Clim	Comm	Bio	Gold
GL3. **Optional**				

Exceptional Biodiversity Benefits

All projects conforming to the Standards must demonstrate net positive impacts on biodiversity within their project zone. This Gold Level Exceptional Biodiversity Benefits criterion identifies projects that conserve biodiversity at sites of global significance for biodiversity conservation. Sites meeting this optional criterion must be based on the Key Biodiversity Area (KBA) framework of vulnerability and irreplaceability. These criteria are defined in terms of species and population threat levels, since these are the most clearly defined elements of biodiversity. These scientifically based criteria are drawn from existing best practices that have been used, to date, to identify important sites for biodiversity in over 173 countries.

Project proponents must demonstrate that the project zone includes a site of high biodiversity conservation priority by meeting either the vulnerability *or* irreplaceability criteria defined below:

1. Vulnerability. Regular occurrence of a globally threatened species (according to the IUCN Red List) at the site:

1.1. Critically Endangered (CR) and Endangered (EN) species - presence of at least a single individual; or

1.2. Vulnerable species (VU) - presence of at least 30 individuals or 10 pairs.

--Table below indicates the 12 Vulnerable and 3 Endangered IUCN Red List species present in some of the 13 participating properties. In reference materials please find folder “Endangered and Vulnerable Birds Fact Sheets” for corroboration. Project developer feels that the avifauna is a sufficiently reliable indicator of overall biodiversity health and presence. Any cursory study of the area can uncover many references to the high diversity of vascular plants, high mammalian diversity and general endemism.

English Name	Scientific Name	Endemism	IUCN Red List Status	Present in Stratum	Evidence
Gray-backed Hawk	*Leucopternis occidentalis*	Tumbesian endemic	Endangered	3	Records by members of GAL Recorded as rare on official site list R. Silanche
Plumbeous Forest-Falcon	*Micrastur plumbeus*	Chocó endemic	Vulnerable	2-3	Repeated, recent sight/audio

					records
Dark-backed Wood-Quail	*Odontophorus melanonotus*	Chocó endemic	Vulnerable	1-2	Generally recorded in the project area; Birds of Ecuador (2001)
Rufous-headed Chachalaca	*Ortalis erythroptera*	Tumbesian endemic	Vulnerable	3	Repeated recent sight/audio records
Brown Wood-Rail	*Aramides wolfi*	Chocó endemic	Vulnerable	3	Several sight/audio records
Banded Ground-cuckoo	*Neomorphus radiolosus*	Chocó endemic	Endangered	3	Very rare species, with a few recent sight/audio records within the project area
Cloud-forest Pygmy-Owl	*Glaucidium nubicola*	Chocó endemic	Vulnerable	1-2	Repeated recent records; Birds of Ecuador (2001)
Little Woodstar	*Acestrura bombus*	Tumbesian endemic	Vulnerable	2-3	Repeated recent records; mentioned Birds of Ecuador (2001)
Giant Antpitta	*Grallaria gigantea*	Northern Central Andes endemic	Vulnerable	1-2	Repeated recent records, photographs; mentioned Birds of Ecuador (2001)
Moustached Antpitta	*Grallaria alleni*	Northern Central Andes endemic	Vulnerable	2	Repeated recent records, photographs; mentioned Birds of Ecuador (2001)
Slaty Becard	*Pachyramphus spodiurus*	Tumbesian endemic	Endangered	3	Recorded as rare within the project area
Long-wattled Umbrellabird	*Cephalopterus penduliger*	Chocó endemic	Vulnerable	2	Lek in project area
Cerulean Warbler	*Dendroica cerulean*	Boreal migrant	Vulnerable	2	Sporadic, recent records yearly
Scarlet-breasted Dacnis	*Dacnis berlepschi*	Chocó endemic	Vulnerable	3	Recorded as rare, but present within project area
Tanager Finch	*Oreothraupis arremonops*	Chocó endemic	Vulnerable	1	Recorded as rare to

					Infrequent but present within project area

ANNEX 2 Bird Species List

List of Endemic Bird Species Including those of Particular Conservation Interest, *i.e.* IUCN Red List Vulnerable and Endangered Species

English name	*Latin name*	Notes
Tinamous	***Tinamidae***	
Berlepschi's Tinamou	*Crypturellus berlepschi*	Chocó endemic
Kites, Eagles, and Hawks	***Accipitridae***	
Gray-backed Hawk	*Leucopternis occidentalis*	Tumbesian endemic, endangered
Falcons and Caracaras	***Falconidae***	
Plumbeous Forest-Falcon	*Micrastur plumbeus*	Chocó endemic, vulnerable
New World Quails	***Odontophoridae***	
Dark-backed Wood-Quail	*Odontophorus melanonotus*	Chocó endemic, vulnerable
Guans and Chachalacas	***Cracidae***	
Rufous-headed Chachalaca	*Ortalis erythroptera*	Tumbesian endemic, vulnerable
Rails, Gallinules, and Coots	***Rallidae***	
Brown Wood-Rail	*Aramides wolfi*	Chocó endemic, vulnerable
Pigeons and Doves	***Columbidae***	
Dusky Pigeon	*Patagioenas goodsoni*	Chocó endemic
Pallid Dove	*Leptotila pallid*	Chocó endemic
Indigo-crowned Quail-Dove	*Geotrygon purpurata*	Chocó endemic
Parrots and Macaws	***Psittacidae***	
Red-masked Parakeet	*Aratinga erythrogenys*	Tumbesian endemic
Pacific Parrotlet	*Forpus coelestis*	Tumbesian endemic
Rose-faced Parrot	*Pionopsitta pulchra*	Chocó endemic
Cuckoos	***Cuculidae***	
Banded Ground-cuckoo	*Neomorphus radiolosus*	Chocó endemic, endangered
Typical Owls	***Strigidae***	
Colombian Screech-Owl	*Megascops colombianus*	Chocó endemic
Chocó Screech-Owl	*Megascops centralis*	Chocó endemic
Cloud-forest Pygmy-Owl	*Glaucidium nubicola*	Chocó endemic, vulnerable
Nightjars and Nighthawks	***Caprimulgidae***	
Chocó Poorwill	*Nyctiphrynus rosenbergi*	Chocó endemic
Hummingbirds	***Trochilidae***	
White-whiskered Hermit	*Phaethornis yaruqui*	Chocó endemic
Purple-chested Hummingbird	*Amazilia rosenbergi*	Chocó endemic
Empress Brilliant	*Heliodoxa imperatrix*	Chocó endemic
Purple-bibbed Whitetip	*Urosticte benjamini*	Chocó endemic
Velvet-purple Coronet	*Boissonneaua jardinii*	Chocó endemic
Brown Inca	*Coeligena wilsoni*	Chocó endemic
Gorgeted Sunangel	*Heliangelus strophianus*	Chocó endemic

Hoary Puffleg	*Haplophaedia lugens*	Chocó endemic
Violet-tailed Sylph	*Aglaiocercus coelestis*	Chocó endemic
Little Woodstar	*Acestrura bombus*	Tumbesian endemic, vulnerable
Trogons and Quetzals	***Trogonidae***	
Chocó Trogon	*Trogon comptus*	Chocó endemic
New World Barbets	***Capitonidae***	
Orange-fronted Barbet	*Capito squamatus*	Chocó endemic
Toucan Barbet	*Semnornis ramphastinus*	Chocó endemic
Toucans	***Ramphastidae***	
Pale-mandibled Araçari	*Pteroglossus erythropygius*	Chocó endemic
Plate-billed Mountain-Toucan	*Andigena laminirostris*	Chocó endemic
Chocó Toucan	*Ramphastos brevis*	Chocó endemic
Woodpeckers and Piculets	***Picidae***	
Lita Woodpecker	*Piculus litae*	Chocó endemic
Chocó Woodpecker	*Veniliornis chocoensis*	Chocó endemic
Scarlet-backed Woodpecker	*Veniliornis callonotus*	Tumbesian endemic
Guayaquil Woodpecker	*Campephilus gayaquilensis*	Tumbesian endemic
Ovenbirds	***Furnariidae***	
Pacific Hornero	*Furnarius cinnamomeus*	Tumbesian endemic
Double-banded Graytail	*Xenerpestes minlosi*	Chocó endemic
Pacific Tuftedcheek	*Pseudocolaptes johnsoni*	Chocó endemic
Uniform Treehunter	*Thripadectes ignobilis*	Chocó endemic
Stub-tailed Antbird	*Myrmeciza berlepschi*	Chocó endemic
Typical Antbirds	***Thamnophilidae***	
Esmeraldas Antbird	*Myrmeciza nigricauda*	Chocó endemic
Antthrushes & Antpittas	***Formicariidae***	
Giant Antpitta	*Grallaria gigantea*	N. Central Andes endemic, VU
Moustached Antpitta	*Grallaria alleni*	N. Central Andes endemic, VU
Yellow-breasted Antpitta	*Grallaria flavotincta*	Chocó endemic
Tapaculos	***Rhinocryptidae***	
Elegant Crescentchest	*Melanopareia elegans*	Tumbesian endemic
Tyrant Flycatchers	***Tyrannidae***	
Pacific Flatbill	*Rhynchocyclus pacificus*	Chocó endemic
Snowy-throated Kingbird	*Tyrannus niveigularis*	Tumbesian endemic, austral migrant
Slaty Becard	*Pachyramphus spodiurus*	Tumbesian endemic, endangered
Cotingas	***Cotingidae***	
Orange-breasted Fruiteater	*Pipreola jucunda*	Chocó endemic
Long-wattled Umbrellabird	*Cephalopterus penduliger*	Chocó endemic, vulnerable
Manakins	***Pipridae***	
Club-winged Manakin	*Machaeropterus deliciosus*	Chocó endemic
Thrushes	***Turdidae***	
Ecuadorian Thrush	*Turdus maculirostris*	Tumbesian endemic
Black Solitaire	*Entomodestes coracinus*	Chocó endemic
Crows, Jays & Magpies	***Corvidae***	
Beautiful Jay	*Cyanolyca pulchra*	Chocó endemic
New World Warblers	***Parulidae***	
Cerulean Warbler	*Dendroica cerulean*	Boreal migrant, vulnerable
Chocó Warbler	*Basileuterus chlorophrys*	Chocó endemic

Tanagers	***Thraupidae***	
Scarlet-breasted Dacnis	*Dacnis berlepschi*	Chocó endemic, vulnerable
Yellow-collared Chlorophonia	*Chlorophonia flavirostris*	Chocó endemic
Scarlet-and-white Tanager	*Erythrothlypis salmon*	Chocó endemic
Glistening-green Tanager	*Chlorochrysa phoenicotis*	Chocó endemic
Rufous-throated Tanager	*Tangara rufigula*	Chocó endemic
Gray-and-gold Tanager	*Tangara palmeri*	Chocó endemic
Blue-whiskered Tanager	*Tangara johannae*	Chocó endemic
Black-chinned Mountain-Tanager	*Anisognathus notabilis*	Chocó endemic
Moss-backed Tanager	*Bangsia edwardsi*	Chocó endemic
Ochre-breasted Tanager	*Chlorothraupis stolzmanni*	Chocó endemic
Scarlet-browed Tanager	*Heterospingus xanthopygius*	Chocó endemic
Dusky Bush-Tanager	*Chlorospingus semifuscus*	Chocó endemic
Yellow-green Bush-Tanager	*Chlorospingus flavovirens*	Chocó endemic
Emberizine Finches	***Emberizidae***	
Crimson-breasted Finch	*Rhodospingus cruentus*	Tumbesian endemic
Tanager Finch	*Oreothraupis arremonops*	Chocó endemic, vulnerable

Source: Mindo Cloudforest Foundation, 2011. Species endemism adopted from The Birds of Ecuador (Robert S. Ridgely and Paul J. Greenfield, Cornell University Press, 2001). IUCN Red List Endangered and Vulnerable status in turn was adopted from Birdlife International Factsheets, on file for the vulnerable and endangered species listed here.

ANNEX 3 Project Profile Suamox

Project profile for Suamox – Río Silanche Forest Corridor (Spanish)

Perfil de proyecto: IBA Río Caoní y el Corredor Biológico Rancho Suamox – Río Silanche

Antecedentes:
En conversaciones mantenidas entre Rafael Ferro, propietario del Rancho Suamox, y Brian Krohnke de Mindo Cloudforest Foundation (MCF) en el año 2008 durante la fase de levantamiento topográfico de Suamox para la iniciativa CarbonNeg, Rafael mencionó la posibilidad de crear un corredor boscoso al conectar los bosques riparios de las cuencas de los ríos Silanche y Caoní. Esta conectividad permitirá la compleción de un CORREDOR BIOLOGICO de más de 70 Km de longitud, incrementando el establecimiento de flora y fauna local al permitir el tránsito de especies de mamíferos, aves e insectos dispersores de semillas y agentes polinizadores. En aquel momento la idea parecía demasiada ambiciosa, pero al estudiar más el caso, nos dimos cuenta que esta futura realidad está casi completa y la parte gruesa del trabajo ya está financiada.

Luego de esta conversación Brian tomo varios puntos con GPS que indicaron que la brecha entre las propiedades consta de apenas 2 km aproximadamente. El sector del Santuario de Aves Río Silanche más cercano a Suamox es comprendido por bosques secundarios con muy buena diversidad de especies y un grado de conservación alto. El Rancho Suamox en la mayoría de su extensión es comprendido entre pastizales y remanentes de bosques secundarios, riparios en su mayoría. Ya en el año 2011 con la financiación de la iniciativa CarbonNeg[54] se tiene la oportunidad de reforestar los pastizales de Suamox con especies nativas, acelerando su recuperación ambiental y su conversión a bosque en un 100%. Los trabajos de reforestación se iniciarán en el mes de Diciembre del 2011 y los viveros ya están comenzados desde Julio, 2011.

La restauración de este corredor biológico tiene especial significancia ya que el Santuario de Aves Rio Silanche y el Rancho Suamox se encuentran dentro de la IBA EC040 del Rio Caoní, perteneciente a los Cantones Pedro Vicente Maldonado y Puerto Quito en el noroccidente de la Provincia de Pichincha. Una IBA o Área de Importancia para la Conservación de las Aves como definido por Birdlife International, es un espacio geográfico que cumple con varios requisitos objetivos en cuanto a su relevancia para la avifauna: tener especies en estado vulnerable o amenazado según la Lista Roja de la UICN; recibir aves migratorias durante parte del año, etc. Cabe destacar que los dos cantones donde se ubica esta IBA demuestran una tendencia al monocultivo de pastizales, palmito y palma africana principalmente, proceso tal que ha producido la fragmentación del bosque reduciéndolo en tan solo 50 años a un 5% del total originario.[55]

A partir del año 2007, con miembros de la comunidad local conocedores del territorio y con el apoyo de la ONG Aves & Conservación, se conformó el Grupo de Apoyo Local de la IBA del Rio Caoní, teniendo como un principal objetivo integrar los remanentes boscosos de los dos cantones y redefinir la extensión y cobertura de la IBA con más apego a la realidad local. Entre los resultados de este esfuerzo se ha dado una mayor relevancia a la conservación de la IBA, y se logró un registro de 455 especies de aves, contra los registros de 230 especies que tenía la comunidad científica anteriormente.[56] Al integrar el territorio se determino un área real de la IBA de 36.000 ha, y adicionalmente se elaboro un plan de estrategias de conservación, destacándose la necesidad de formar corredores biológicos que conecten

[54] Esta iniciativa de Mindo Cloudforest Foundation es un proyecto de reforestación con especies nativas para la restauración de bosques y captura de Gases del Efecto Invernadero que comienza a trabajar sobre 500 hectáreas en las provincias Pichincha e Imbabura.
[55] Datos de los departamentos de medio ambiente en los cantones referidos.
[56] Este total para la IBA se compara con la lista de especies observadas únicamente en el Santuario de Aves Río Silanche, una propiedad de 70 hectáreas: 274. Lista descargable en http://www.mcf.ec.

todos los remanentes boscosos, a través de programas de reforestación, bien sean estos públicos o privados.

Mapa de referencia de la IBA Río Caoní:

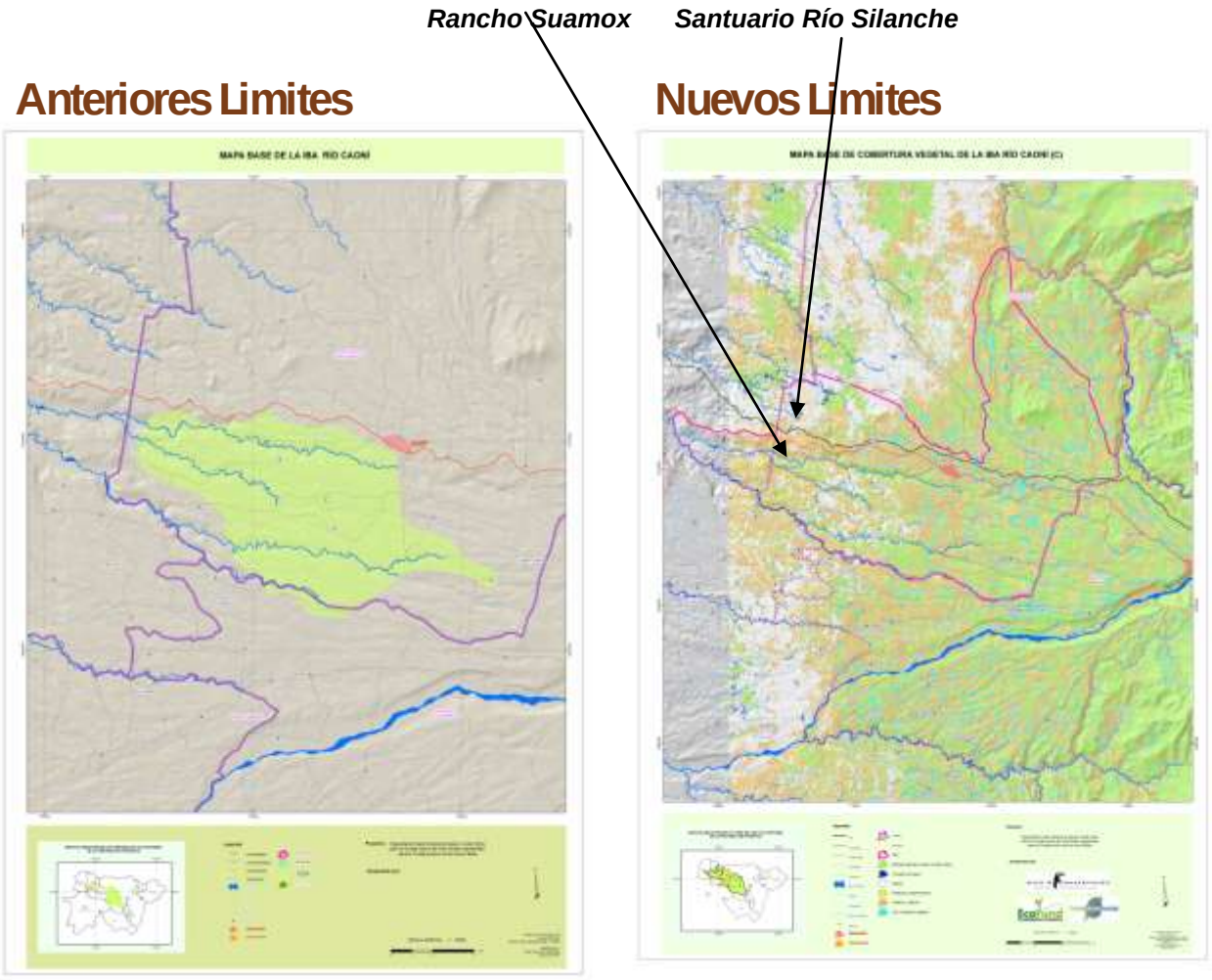


Ilustración 1

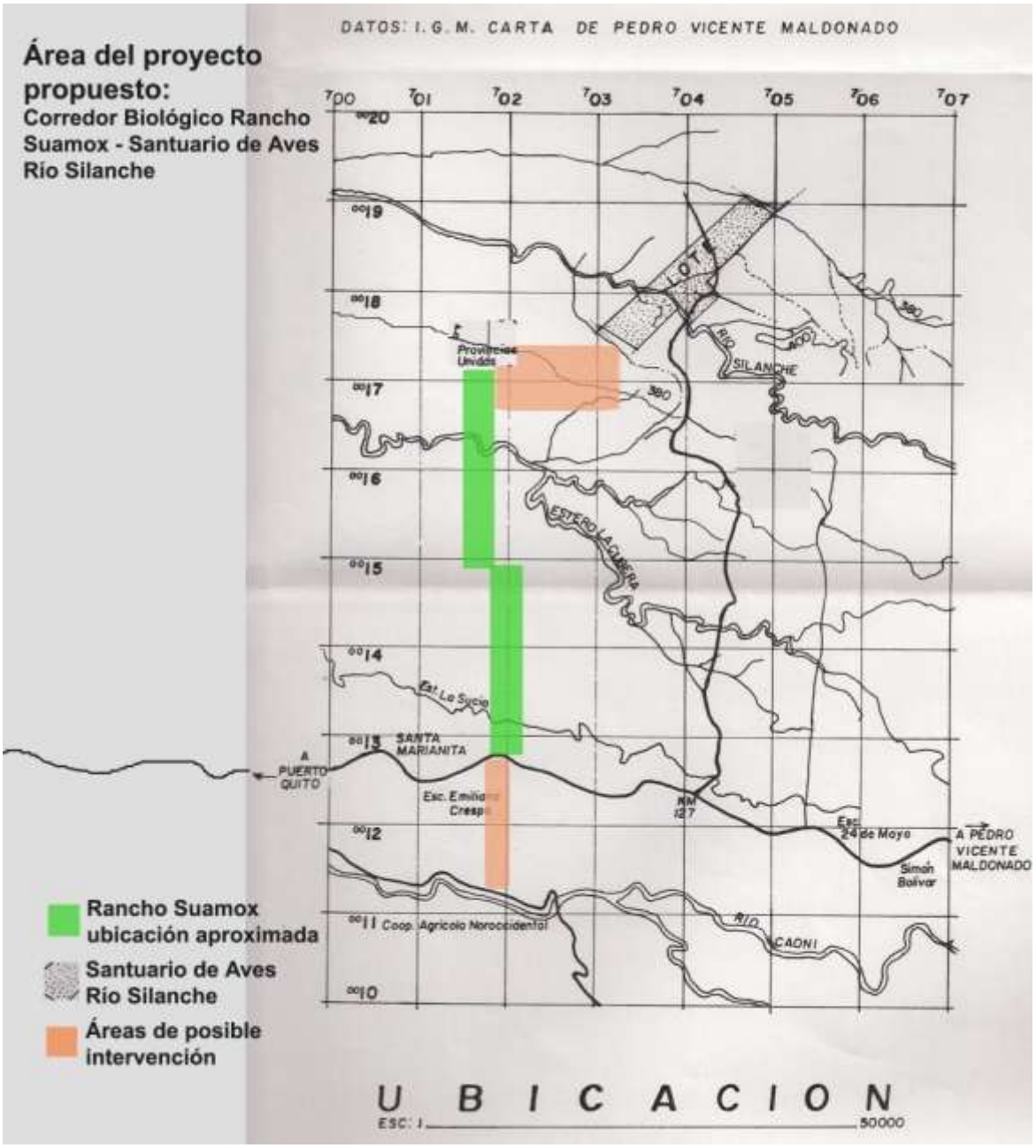


Ilustración 2

Problema que se soluciona con el proyecto:
El corredor planificado se construirá en un panorama de bosques remanentes cada vez más aislados, y vinculará una mancomunidad de los cantones Puerto Quito y Pedro Vicente Maldonado en un trabajo de restauración ecológica que contribuirá a la sostenibilidad de las poblaciones de avifauna, el futuro del sector de eco-turismo y la protección de fuentes de agua.

Situación legal y político de la propuesta:
Tanto el Municipio del Cantón Puerto Quito como el de Pedro Vicente Maldonado se han propuesto el tema de mejoramiento ambiental y la seguridad del recurso agua como actividades prioritarias como se evidencia con la Ordenanza XX de Puerto Quito aprobado en fecha XX para estimular la reforestación de los bosques ripiaros, ya que este territorio, tan reciente como la década de los sesenta fue en su gran mayoría bosque lluvioso y ahora posee apenas el 4% de sus bosques primarios, habiendo sido la conversión a cultivos de palma Africana, cacao, pastizales y palmito los motores de esta deforestación.

En el espacio que llamamos la brecha entre los bosques del corredor está ubicado el caserío Las Provincias del Cantón Puerto Quito y consta de XX familias, la iglesia XX y la escuela fiscal Martha Bucaram de Roldós con 11 estudiantes entre 5 y 13 años de edad.[1]

Enfoque del proyecto y acciones propuestas:
Crear e implementar un plan de manejo para el área del corredor, incluyendo el Rancho Suamox, el Santuario de Aves Río Silanche y las tierras privadas que se ubican entre estos dos territorios. No se busca alterar la tenencia de la tierra o mermar los ingresos económicos percibidos por la población local, sino incentivarles a ellos a que sean partícipes de varios cambios en el uso y la percepción de la tierra, creando nuevas oportunidades en el sector turístico y mejores ingresos a nivel de las fincas.

1. Realizar un levantamiento topográfico y crear un geodatabase en un Sistema de Información Geográfico del área del corredor con el apoyo de los departamentos catastrales de los dos municipios involucrados.
2. Realizar un levantamiento biológico del área del corredor con el apoyo de miembros del Grupo de Apoyo Local de la IBA.
3. Realizar un estudio socio-económico del área del corredor para conocer las necesidades y deseos de la población circundante.
4. Investigar sobre posibles acciones para el manejo do del corredor que incluya:
    a. El apoyo a actividades productivas amenas con el ambiente
    b. Concientización ambiental entre la población local y los estudiantes de la escuela Martha Bucaram de Roldós
    c. Capacitación en guianza y protección ambiental con la población local
5. Investigar las ordenanzas municipales existentes que puedan dar el sustento legal para acciones de conservación de los bosques existentes en el corredor y la protección de los bosques a ser reforestados.
6. Proponer restricciones en el uso del suelo de las tierras privadas ubicadas en la 'brecha' para evitar la ampliación de la frontera agrícola.
7. Facilitar y financiar la implementación de parcelas de reforestación que tiendan a ampliar el corredor creando áreas de amortiguamiento y cordones de conectividad a lo largo de los cerramientos de los pastizales y demás campos agrícolas.
8. Contratación de 1-2 guardabosques quienes serán los enlaces entre la comunidad, los municipios y los usuarios del recurso turístico fortalecido.

Plazo del proyecto:
Un año a partir de consecución de financiamiento, y con la actividad 8 continuando por cuatro años bajo la supervisión de los actores.

Costes del proyecto:

Act.	*Detalle*	*Costo unidad*	*Cantidad*	*Total*
1	*SIG*	*$5.000*	*1*	
2	*Info. Biológico*	*$2.000*	*1*	*$2.000*
3	*Info. Socio-econo*	*$2.500*	*1*	*$2.500*
4	*Plan de manejo*	*$8.000*	*1*	*$8.000*
5	*Invest. Legal*	*N/A*		
6	*Restricciones*	*N/A*		
7	*Reforestación*	*$10.000*	*1*	*$10.000*
8	*Guardabosques*	*$450*	*48*	*$21.600*
	TOTAL PROYECTO			*$49.600*

Posibles fuentes de financiamiento:

1. La fundación belga BOS+ tropen quienes han apoyado diferentes actividades Mindo Cloudforest Foundation, incluyendo el levantamiento de información que dio el comienzo a la iniciativa CarbonNeg.

2. Neotropical Migratory Bird Conservation Act Grant: Estos fondos de contraparte son el producto de una ley estadounidense que obliga ese gobierno a invertir en proyectos en las Américas. Los requisitos principales son dos: que el área a ser intervenido tenga hábitat de aves migratorias y que un 75% del proyecto sea financiado por otras fuentes. En ambos cumplimos por las aves, el proyecto de reforestación y las inversiones y gastos operativos tanto de la familia Ferro en su Rancho Suamoz como de MCF en el Santuario de Aves Río Silanche.

3. Ecofondo del Oleoducto de Crudos Pesados, el cual atraviesa el Rancho Suamox.

4. Venta de más derechos de los tCO2e producto del proyecto.

Annex 4 Plan General de Manejo Forestal Adaptativo

Found in folder “Other Reference Materials,” file name “PGMF_CarbonNeg_JUNIO.docx.”