THE CHOCÓ-DARIÉN CONSERVATION CORRIDOR REDD PROJECT

Project Title	The Chocó-Darién Conservation Corridor REDD Project
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Table of PD Requirements

PDR	Description	Applicability
PDR.1	For each applicability condition, a statement of whether it applies to the project. If the applicability condition does not apply to the project, justification for this conclusion.	Applicable
PDR.2	Where applicability conditions apply, credible evidence in the forms of analysis, documentation or third-party reports to satisfy the condition.	Applicable
PDR.3	Definition of forest used by the project proponent and its source.	Applicable
PDR.4	A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.	Applicable
PDR.5	Credible documentation demonstrating control of the project area, or documentation that the provisos listed in the case of less than 80% project control at the time of validation delineated in this methodology are met.	Applicable
PDR.6	The project start date.	Applicable
PDR.7	The project crediting period start date and length.	Applicable
PDR.8	The dates for mandatory baseline reevaluation after the project start date.	Applicable
PDR.9	A timeline including the first anticipated monitoring period showing when project activities will be implemented.	Applicable
PDR.10	A timeline for anticipated subsequent monitoring periods.	Applicable
PDR.11	A list of the greenhouse gases considered.	Applicable
PDR.12	A list of the selected carbon pools.	Applicable
PDR.13	The definition and evidence to support the definition of a merchantable tree if the baseline scenario or project activities include logging.	Not applicable. (See text.)
PDR.14	A list and descriptions of all instances in the group.	Not applicable. Not a grouped project.
PDR.15	A map of the locations or boundaries of all instances in the group indicating that all instances are in the same region.	Not applicable. Not a grouped project.
PDR.16	A map of the common reference area, proxy area, activity-shifting leakage area and market-effects leakage area.	Not applicable. Not a grouped project.
PDR.17	A list of the agents and drivers of deforestation, including quantitative descriptions of agent mobilities.	Applicable
PDR.18	A narrative describing the agents and drivers of deforestation.	Applicable
PDR.19	Descriptions of agents and drivers including any useful statistics and their sources.	Applicable
PDR.20	A list of external drivers (covariates) of deforestation used in the model, if any, that may be identified as part of a PRA, expert knowledge or literature (e.g. median household income, road density, rainfall).	Not applicable. No covariates were used.

PDR	Description	Applicability
PDR.21	A digital (GIS-based) map of the accounting areas, including aerial or satellite imagery showing that they are completely forested as of the project start date and 10 years prior to the project start date.	Applicable
PDR.22	Justification and area of the selected accounting areas.	Applicable
PDR.23	If Type P1 or Type P2 are selected, justification for meeting the definition of APD in the current VCS-approved AFOLU requirements.	Not applicable. Project is Type U2.
PDR.24	If Type P1 is selected, evidence of legally-sanctioned commercial harvest in the baseline scenario.	Not applicable. Project is Type U2.
PDR.25	If Type U1 is selected, a spatial analysis of the project accounting area showing that at least 25% of the perimeter is within 120 meters of deforestation that occurred within 10 years prior to the project start date and showing that the reference area is adjacent to at least 25% of the project accounting area	Not applicable. Project is Type U2.
PDR.26	If Type U2 is selected, a spatial analysis of the project accounting area showing that 25% of the perimeter is within 120 meters of deforestation that occurred within 10 years of the project start date.	Applicable
PDR.27	If Types U1, U2 or U3 is selected, a spatial analysis of the project accounting area showing that it is within 120 meters of deforestation that occurred within 10 years prior to the project start date.	Applicable
PDR.28	A map of the delineated boundaries.	Applicable
PDR.29	Maps of the landscape configuration, including: a. Topography (elevation, slope, aspect); b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);c. Access points; d. Soil class maps (if available); e. Locations of important markets; f. Locations of important resources like waterways or roads; and g. Land ownership/tenure boundaries.	Applicable
PDR.30	A narrative describing the rationale for selection of proxy area boundaries.	Applicable
PDR.31	Results of a spatial analysis to demonstrate the proxy area is not forested, on average, as of the project start date.	Applicable
PDR.36	A map of the delineated boundaries, demonstrating that the reference area is held by the identified baseline agent or agents and does not include the project area.	Applicable

PDR	Description	Applicability
PDR.37	Maps of the landscape configuration, including: a. Topography (elevation, slope, aspect); b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);c. Access points; d. Soil class maps (if available); e. Locations of important markets; f. Locations of important resources like waterways or roads; and g. Land ownership/tenure boundaries.	Applicable
PDR.38	A description of the rationale for selection of reference area boundaries.	Applicable
PDR.39	Results of a spatial analysis to demonstrate the reference area had as much forest as the project accounting area at some point in time during the historic reference period.	Applicable
PDR.42	Established reference period boundaries.	Applicable
PDR.43	A list of available historic imagery for the reference area.	Applicable
PDR.44	A timeline of important events as they relate to the agents and drivers of deforestation.	Applicable
PDR.45	Narrative rationale for the selection of the reference period.	Applicable
PDR.46	A map of the reference area showing the area of "double-coverage."	Applicable
PDR.47	Quantification of "double coverage"(greater than 90%).	Applicable
PDR.48	A line plot of the historic image dates to confirm stationarity.	Applicable
PDR.49	Evidence that all image pixels are not more than 30m x 30m.	Applicable
PDR.50	Empirical evidence that imagery is registered to within 10% RMSE, on average.	Applicable
PDR.51	The sample size.	Applicable
PDR.52	A map of the reference area showing the sample point locations.	Applicable
PDR.53	The covariates that were considered and their data sources.	Not applicable. No covariates were used.
PDR.54	The parameters in θ that were evaluated during model selection.	Not applicable. No covariates were used.
PDR.55	The parameters in $\hat{\theta}$ of the selected model.	Not applicable. No covariates were used.
PDR.56	The rationale used for selecting $\hat{\theta}$ including comparisons of AIC.	Not applicable. No covariates were used.
PDR.57	A protocol for interpreting forest state from imagery.	Applicable
PDR.58	The results of an independent check of the interpretation.	Applicable
PDR.59	Evidence that systematic errors, if any, from the independent check of the interpretation were corrected.	Applicable
PDR.66	A table of covariate values as of the project start dates and a description of how the values were determined including any	Not applicable. No covariates were used.

PDR	Description	Applicability
	interpolation or extrapolation methods.	
PDR.69	The project shift parameter γ as the number of days between the beginning of the historical reference period and the project start date.	Applicable
PDR.70	The parameter q as the number of days between the onset of degradation and the beginning of deforestation.	Applicable
PDR.71	If the default of zero is not selected for q, then a justification for the determination of q.	Not applicable. Default value used.
PDR.72	The parameter $\hat{r}_U$ as the area of non-forest in the project area as of the project start date that was forest ten years prior to the project start date.	Applicable
PDR.73	Description of how $\hat{r}_U$ was obtained.	Applicable
PDR.74	Results of GIS analysis to determine or measure $\hat{r}_U$ in the project area including the dates of images used to identify deforestation.	Applicable
PDR.75	Description of how samples from the reference area were selected including stratification, if any.	Not applicable. Default value used.
PDR.76	A map of sample locations in the reference area.	Not applicable. Default value used.
PDR.77	A table showing the conversion time for each area (farm or otherwise) from which samples were taken.	Not applicable. Default value used.
PDR.78	Description of and statistics for the method applied to estimate χ̂_SOC.	Not applicable. Default value used.
PDR.79	Graph of projected decay model over project lifetime.	Not applicable. Default value used.
PDR.80	Inclusion of decay model on which parameter is based	Not applicable. Default value used.
PDR.81	Explicit description of referenced literature, including project location, sampling methodology, included species, sample size, and decay parameter upon which decay is based.	Not applicable. Default value used.
PDR.82	Graph of projected decay model over project lifetime	Not applicable. Default value used.
PDR.83	If decay model is based on any other element besides carbon, defense of ability to predict carbon decay must be provided.	Not applicable. Default value used.
PDR.84	A qualitative description of the baseline scenario for each selected carbon pool.	Applicable
PDR.85	All required documentation as specified in section 3.1 for the project prior to the baseline reevaluation.	Not applicable. No baseline reevaluation.
PDR.86	All required documentation as specified in section 3.1 for the project after the baseline reevaluation including the reevaluation period.	Not applicable. No baseline reevaluation.
PDR.87	A narrative of the reevaluation including any obstacles and how they were overcome.	Not applicable. No baseline reevaluation.
PDR.88	A map of the new reference area.	Not applicable. No

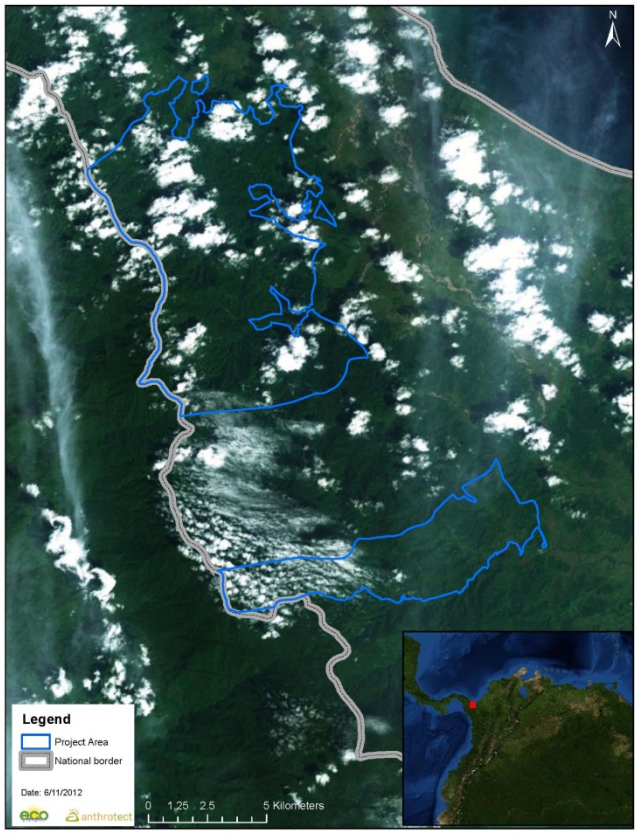
PDR	Description	Applicability
		baseline reevaluation.
PDR.89	Summary of new data observed in the new reference area.	Not applicable. No baseline reevaluation.
PDR.90	The re-parameterized values $\hat{\alpha}$, $\hat{\beta}$ and $\hat{\theta}$.	Not applicable. No baseline reevaluation.
PDR.91	A list of alternative land use scenarios to the project.	Applicable
PDR.92	Justification for the selected baseline scenario. This justification can include expert knowledge, results from the participatory rural appraisal and ex-ante estimates of avoided emissions (see sections 2.4.1 and 3.4.5).	Applicable
PDR.93	An investment or barriers analysis proving that the project is not the most economical option	Applicable
PDR.94	A common practice analysis including a list of project activities and the drivers of deforestation that they address.	Applicable
PDR.95	Evident compliance with the minimum requirements of the aforementioned VCS tool. This evidence may be the same as the evidence provided to meet reporting requirements listed in section 2.2.	Applicable
PDR.96	A list of project activities designed to mitigate leakage.	Applicable
PDR.97	A map of the delineated boundaries.	Applicable
PDR.98	Maps of the landscape configuration, including: a. Topography (elevation, slope, aspect); b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);c. Access points; d. Soil class maps (if available); e. Locations of important markets; f. Locations of important resources like waterways or roads; and g. Land ownership/tenure boundaries.	Applicable
PDR.99	A narrative describing the rationale for selection of activity-shifting leakage area boundaries.	Applicable
PDR.100	Results of a spatial analysis to demonstrate the activity-shifting leakage area is entirely forested as of the project start date.	Applicable
PDR.101	Results of a spatial analysis to demonstrate the activity-shifting leakage area is no larger than the project accounting area.	Applicable
PDR.102	The selected discount factor $p_{L\,ME}$.	Not applicable. No market effects leakage.
PDR.103	Calculations of $c_{L\,AGMT}$ in the market-effects leakage area, including references to literature if cited.	Not applicable. No market effects leakage.
PDR.104	If the lowest discount factor (0.1) is selected from Table 6 of the methodology or is not determined using a market-effects leakage area, the project description shall include the following: Justification for the selection of the discount factor.	Not applicable. No market effects leakage.

PDR	Description	Applicability
PDR.105	A map of the delineated boundaries.	Not applicable. No market effects leakage.
PDR.106	Maps of the landscape configuration, including: a) topography (elevation, slope, aspect); b) recent land use and land cover (either a thematic map created by the project proponent or publicly available map; c) access points; d) soil class maps (if available); e) locations of important markets; f) locations of important resources like waterways or roads; and g) land ownership/tenure boundaries.	Not applicable. No market effects leakage.
PDR.107	A narrative describing the rationale fo selection of market-effects leakage area boundaries.	Not applicable. No market effects leakage.
PDR.108	Results of a spatial analysis to demonstrate the market-effects leakage area is entirely forested as of the project start date.	Not applicable. No market effects leakage.
PDR.109	Results of a spatial analysis to demonstrate the market-effects leakage area is as large or larger than the project start date.	Not applicable. No market effects leakage.
PDR.110	The projected avoided baseline emissions, project emissions and leakage for each monitoring period over the lifetime of the project.	Not applicable. No market effects leakage.
PDR.111	A narrative description of sources used to estimate the leakage rate and demonstration that the estimated rate is conservative.	Not applicable. No market effects leakage.
PDR.112	If included in project activities, a description of procedures used to estimate the rate of biomass burning and charcoal production and demonstration that these estimates are conservative.	Not applicable. No biomass burning or charcoal production in project activities.
PDR.113	The value for each variable in Appendix G.	Applicable
PDR.114	Summary of sampling procedures for the project accounting areas, with a copy of a sampling protocol used to carry out measurements.	Applicable (see Annex Y – Monitoring Plan)
PDR.115	Summary of sampling procedures for the proxy areas, with a copy of a sampling protocol used to carry out measurements.	Applicable (see Annex Y – Monitoring Plan)
PDR.116	Summary of sampling procedures for the activity-shifting leakage areas, with a copy of a sampling protocol used to carry out measurements.	Applicable (see Annex Y – Monitoring Plan)

1 Project Details

1.1 Summary Description of the Project

This project leverages carbon finance to avoid mosaic conversion of tropical forests and therefore reduce greenhouse gas emissions. The project employs a Reduced Emissions from Deforestation and Degradation (REDD) project methodology to determine the magnitude of these emissions reductions. Through a combination of forest protection and sustainable development activities, this project is estimated to avoid the emission of 2.5 Million metric tonnes of CO_2e over the project lifetime that would have resulted from deforestation of approximately 50% of the project area over the next thirty years.



The Chocó-Darién Conservation Corridor is located in the Darién region of northwest Colombia within the administrative jurisdictions of the Department of Chocó and the Municipality of Acandí. The Colombian Darién is part of the Chocó biogeographic region, recognized as one of the most biodiverse regions in the world for its strategic geographic location and high levels of species endemism.

The project is additional because the project activities would not have been possible without carbon financing. The project baseline is an extension of actual deforestation that was occurring aggressively in the reference area adjacent to the project area.

1.2 Sectoral Scope and Project Type

The project falls under VCS Sectoral Scope 14 - Agriculture, Forestry and Other Land Uses under project activities Reduced Emissions from Deforestation and Degradation (REDD). This project is categorized as Type U2 (AUDD mosaic deforestation) by the definition provided in the VM0009 methodology version 2.0.

This is not a grouped project.

1.3 Project Proponent

The project proponent is Anthrotect, a Colombian organization dedicated to making conservation a viable alternative to economic opportunities that result in land degradation. Anthrotect works with

community landholders to implement payment for ecosystem services projects that connect communities with emerging markets for carbon and biodiversity.

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1.4 Other Entities Involved in the Project

Anthrotect is leading project design and carbon finance of this project. The following organizations also are involved in the capacities indicated below:

Organization	Capacity	Contact	Addresses
Cocomasur	Implementing Organization	Ms. Everildys Córdoba Project Coordinator	Barrio Julio Córdoba Acandí, Colombia +57 (310) 369-1631 everildyscordoba@gmail.com
Fund for Environmental Action	Implementing Partner	Mr. Jose Luis Gomez Executive Secretary	Carrera 7 No. 32 – 33 Piso 27 Bogota, Colombia +57 (1) 285-3862 joselgomez@accionambiental.org
ecoPartners	Technical Partner	Dr. Kyle Holland President	2930 Shattuck Ave., Ste. 305 Berkeley, CA 94703 USA +1 (415) 634-4650 kholland@ecopartnersllc.com
Carnegie Institution for Science	Technical Partner	Dr. Greg Asner Professor, Dept. of Global Ecology	260 Panama St. Stanford, CA 94305 USA +1 (650) 223-6902 gpa@stanford.edu
Strategic Environmental Management	Legal Advisor	Ms. Maria del Pilar Pardo Managing Partner	Carrera 11 No. 81-26 Piso 5 Bogota, Colombia +57 (1) 621-3280 mppardo@gestionambientalestrategica.com
Medellin Botanical Garden	Technical Partner	Dr. Alvaro Cogollo Scientific Director	Calle 73 N 51D – 14 Medellin, Colombia +57 (4) 444-5500 alvaro.cogollo@botanicomedellin.org

Table 1: Other entities involved in the project.

1.5 Project Start Date

PDR.6 The project start date.

The project start date is October 18, 2010.

1.6 Project Crediting Period

PDR.7 The project crediting period start date and length.

The project crediting period begins at the project start date October 18, 2010 and continues until October 17, 2040.

PDR.8 The dates for mandatory baseline reevaluation after the project start date.

Per current VCS requirement, the baseline must be reevaluated every 10 years. As such, the mandatory baseline reevaluation shall occur before October 17, 2020.

PDR.9 A timeline including the first anticipated monitoring period showing when project activities will be implemented.

Date	Project Activity or Event
October 18, 2010	Project start date and project crediting period start date. Date when *Cocomasur* General Assembly approved the Chocó-Darién Corridor Conservation REDD Project.
September, 2009	Legal documentation completed that enables Council to operate under the national legal framework. (Refer to Annex Z – Community Council Certificate.)
January, 2012	Five field trips completed to improve demarcation of territorial boundaries.
March 1, 2012	Initial inventories in project accounting area, proxy area and activity-shifting leakage area complete.
May 31, 2012	Initial community survey completed to track progress in health and education.
August 15, 2012	First verification (monitoring) event
August 15, 2013	Second verification event

Table 2: Timeline indicating project activity and monitoring period for which each will be implemented.

PDR.10 A timeline for anticipated subsequent monitoring periods.

Monitoring will be conducted annually for the duration of the project crediting period. Monitoring will include baseline re-evaluation no less than once every 10 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	
Reducing Emissions from Deforestation and Degradation (REDD)	X
Project	X
Large project	

Vintage Year	Estimated GHG emission reductions or removals (tCO2e)
2010	**11,777**
2011	**57,313**
2012	**59,927**
2013	**64,392**
2014	**67,257**
2015	**74,589**
2016	**79,520**
2017	**82,116**
2018	**87,290**
2019	**87,814**
2020	**98,835**
2021	**100,865**
2022	**99,808**
2023	**101,101**
2024	**103,708**
2025	**115,151**
2026	**114,919**

Vintage Year	Estimated GHG emission reductions or removals (tCO2e)
2027	**98,839**
2028	**85,847**
2029	**87,147**
2030	**90,034**
2031	**87,198**
2032	**81,626**
2033	**76,110**
2034	**69,881**
2035	**86,566**
2036	**80,649**
2037	**61,595**
2038	**59,069**
2039	**66,270**
2040	**71,852**
Total estimated ERs	2,509,065
# of crediting years	31
Average annual ERs	80,938

Table 3: Estimated GHG emission reductions or removals.

1.8 Description of the Project Activity

The Chocó-Darién Conservation Corridor REDD Project began when the *Cocomasur* General Assembly approved the project plan on October 18, 2010. The project will use carbon financing to mitigate the conversion threats posed by cattle ranching, agriculture, and selective logging in the Chocó-Darién Conservation Corridor. The project will utilize carbon revenues to fund 14 activities designed to reduce deforestation in the project area. The project activities pertain to three themes:

- *Building governance capacity*, by raising awareness of collective identity and rights, developing criteria and procedures for resolving land disputes, constructing collective visions and strategic plans for land use, and improving information, education and communication for effective local governance;
- *Improving enforcement and management*, by demarcating territorial boundaries, establishing regular community surveillance to conserve existing forest, conducting ongoing monitoring of forest carbon stocks, promoting best practices for administrative and financial policies and processes; and,
- *Developing economic alternatives and incentives*, by improving agricultural and silvopastoral practices and technologies, developing plans and procedures for equitable and sustainable timber harvesting, assisting in the regeneration of deforested and degraded areas, identifying and increasing access to credit and markets for non-timber goods and services, educating and raising awareness of ecosystem service values, and increasing access to health and educational resources.

Project Activity	Description	Start Date
Governance		
Community territory awareness and land dispute resolution	Review of local councils and families belonging to the community organization in order to update and strengthen membership criteria, policies, and procedures. Community events will educate, inform, and build awareness regarding the suite of collective rights and benefits (including common pool natural resources) afforded by the land title.	October 2010
Governance education and communication	Regular reporting and feedback to project beneficiaries and other local stakeholders according to international best practices for organizational development and governance.	October 2010
Internal transparency and accountability	Regular monitoring of implementation activities and expenses by the Fund for Environmental Action in addition to an annual financial review by an independent auditor.	January 2012
Land use planning	Land management plans will be prepared to guide land use and activities in areas of particular social and environmental importance. Zoning exercises will establish permissible activities, with an emphasis on the conservation and enhancement of areas of high conservation value.	October 2012
Enforcement and Management		
Territorial demarcation	Community teams carry out workshops, field assessments, legal reviews, and participatory mapping exercises to strengthen recognition of project boundaries and consolidate land titles.	August 2010
Forest patrols	Community teams perform regular patrols designed to	August 2010

Project Activity	Description	Start Date
	prevent, detect, and document illegal encroachment into the territory as well as community violations of the territorial management plan.	
Monitoring of forest carbon stocks	Community members receive comprehensive training to carry out tree and soil measurements, ground -truthing in the reference area, development of allometric equations, and field surveys to establish baselines for monitoring leakage.	October 2011
Administrative and financial best practices	External advisors help to assess current local administrative and financial capacity and design measures to ensure effective project governance.	April 2012
Economic Alternatives and Incentives		
Access to health and educational resources	New community clinics and health insurance will increase health access for project beneficiaries. Access to education will expand via curriculum development, teaching materials, and continued learning through higher education grants.	July 2011
Education and awareness of ecosystem service values	Community members will participate in and learn about new knowledge and experience gained through biodiversity inventory and other monitoring.	October 2012
Sustainable timber harvesting	Community-led forest management plan will seek to balance environmental service values with sustainable harvesting of timber and non-timber forest products. Community cooperative will be formed to leverage existing knowledge, skills and resources within *Cocomasur*.	January 2013
Reforestation	Activity will employ native species at risk of extinction and species of high value to communities and wildlife. Priority areas will include areas facing high conversion threat and areas of high conservation value.	January 2013
Improved agricultural and silvopastoral practices	Community members will receive information and training on state of the art techniques to improve land productivity.	July 2013
Access to credit and markets for non-timber goods and services	Project funding will be leveraged to establish semi-formal community financial institutions to finance sustainable microenterprises and other income-generating activities. Multi-stakeholder research on new economic and livelihood alternatives will be based on fair and sustainable resource use.	July 2013

Table 4: Major Project Activities.

The project will be implemented incrementally according to the strategic plan, which was developed by *Cocomasur* with technical guidance from Anthrotect. (Refer to Annex L – Project Proponent Strategic

Plan.) Foundational activities such as territorial demarcation, land use planning, and strengthening local governance have been prioritized.

Community-led forest patrols are intended to monitor, detect, prevent, and mitigate unauthorized activities within the forests titled to COCOMASUR. Such activities may include (1) illegal activities, especially logging and encroachment by non-members, as well as (2) legal but prohibited activities carried out by members of COCOMASUR without the express authorization of the Governing Council. At the same time, forest patrols may be granted other related responsibilities, such as participation in ongoing measurement of the permanent plots, or assisted regeneration in previously occupied or degraded areas. (Refer to Annex Y – Monitoring Plan.)

These activities build on traditional surveillance practices that the community calls "territorial reconnaissance." Due to the armed conflict taking place in the 1990s, this custom became less and less frequent and was nearly abandoned. One of the first actions of the project was to reinvigorate the practice by meeting with the Local Council in each village to establish protocols for communication with the Central Council. Teams of five persons were selected to informally monitor different lowland areas of the territory, and communicate any evidence of encroachment via the new system. This approach is effective because Local Councils maintain constant communication with the inhabitants in their respective regions, and thereby notice any activity going on in the forest. Soon, these teams will be formally trained in GPS-based techniques for gathering evidence as well as appropriate measures for responding to encroachment.

The forest patrols shall be carried out according to the protocols and requirements prescribed in Annex Y – Monitoring Plan. *Cocomasur* completed at least five field trips during 2010-2011 to borders and other high-risk areas for more focused surveillance. Additional surveillance activities were completed during December to June of 2012 by teams conducting taxonomic identification and carbon stocks assessments, which detected and documented several instances of encroachment during their field surveys.

1.9 Project Location

The project is located in the Darién region of northwest Colombia within the administrative jurisdictions of the Department of Chocó and the Municipality of Acandí. The coordinates of the approximate center of the project area are 8.405559, -77.330833. The project is approximately 250km northwest of Bogota and 10km southwest of the town of Acandí, and is adjacent to the Colombia-Panama border.

1.9.1 Delineating the Spatial Boundaries

A map with the following geographic or physical boundaries is provided in Annex A - Map of Project Area, Annex C - Map of DEM, and Annex D - Map of Slope:

- Name of the project area (compartment or allotment number, local name)
- Digital maps of the area, including geographic coordinates of vertices
- Total land area

- Details of ownership, including user rights and/or land tenure information
- Topography
- Roads
- Major rivers and perennial streams
- Land use/vegetation type classification

PDR.4 A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.

The project area covers all land (13,465 ha) contained within Collective Title No. 1502 held by *Cocomasur* (The Council of Black Afro-Colombian Communities of the Tolo River Basin and Southern Coastal Zone), a project proponent. Refer to Annex A – Map of Project Area, which includes the requirements for delineating the geographic boundaries of the project area.

PDR.5 Credible documentation demonstrating control of the project area, or documentation that the provisos listed in the case of less than 80% project control at the time of validation delineated in this methodology are met.

Cocomasur holds Collective Title No. 1502 to the 13,465 ha project area. The title was awarded on August 1, 2005 by the *Instituto Colombiano para el Desarrollo Rural* (INCODER) and is managed by the nine Local Councils of *Cocomasur*. (Refer to Annex M – Collective Land Title – *Cocomasur* Communities.)

1.10 Conditions Prior to Project Initiation

Notwithstanding the recognition and demarcation of collective titles in the Chocó, many Cocomasur communities are still uncertain as to their territorial boundaries and rights. Inadequate resources have been allocated to guarantee implementation of these progressive new property laws and enable territorial governance building. A key law mandated by the new constitution regarding territorial ordering, for example, has yet to be passed. There is widespread ignorance of Law 70 - which was passed by Congress in 1993 and which grants collective territorial rights and autonomous governance powers to Afro-Colombia landholders - and many communities lack the internal governance structures and regulations necessary for effective resource management. Moreover, there were not sufficient financial resources for project activities such as the design and implementation of protected areas or the development of alternative livelihoods.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Anthrotect and the other project proponents are committed to complying with all applicable international treaties and agreements as well as national laws. Relevant laws include the following:

Law 52 of 1994

Law 52 of 1994 regulates article 342 of the 1991 Constitution and defines the procedures for the elaboration, preparation, approval, and implementation of development plans. It represents the law

that most affects the structuring and implementation of sustainable development in the Colombia Darién. In this sense, and although the program stems from a national initiative, departmental and municipal authorities are called on to harmonize their programs, plans and projects for local investment, to be established as part of this protocol. (Refer to Annex N – Colombia Law 52.)

Law 388 of 1997

By this standard, the national government established the mechanisms for municipalities to advance the management of their territories, guiding actions to rational and equitable use of land, the preservation and protection of ecological and cultural heritage, and disaster prevention. The law constitutes a basic tool for planning and managing the physical development of land in each of the municipalities in the country, specifically in regard to land use. (Refer to Annex O – Colombia Law 388.)

In developing their skills, departments will coordinate their policies, guidelines and strategies for physical and territorial management at the departmental level with the programs, projects and actions of the regional and local levels by adopting management plans for all or specific portions of its territory. The municipalities and districts must develop and adopt territorial management plans that regulate land use in urban areas, promote rural development in accordance with the law, optimize use of available land, and coordinate sector-wide plans in line with national and departmental policies and plans.

Agrarian Reform

The Agrarian Reform Act (Law 160 of 1994) for example, partially regulated by Decree 1031 of 1994 defines procedures for voluntary negotiation between farmers and land owners so as to facilitate negotiations and diminish conflict. For events that cannot be voluntarily negotiated, Decree 2666 of 1994 establishes procedures for rural land acquisitions by INCORA (INCODER).

Moreover, to stabilize the situation with respect to the demarcation and delimitation of Los Katíos National Park, indigenous reserves and lands of black communities, areas that now have serious conflicts of possession and territorial dominance, may apply the provisions of Decree 2663 of 1994, which establishes procedures for the acquisition of rural land with these characteristics. Since the region also includes untitled lands that traditionally do not belong to black or indigenous communities, Decree 00982 of 1996 can be applied in the awarding of these vacant lands, which is also regulated by INCORA (INCODER).

Regional Development

The environmental planning functions of local authorities are defined in Law 99/93, Articles 64, 65, 66 and 67. They emphasize the need to harmonize regional plans with the national level. In practice, the municipalities use the environmental guidelines outlined in national policies such as the National Development Plan by the Ministry of Environment or other regional environmental authorities, in order to submit projects for local councils.

National Parks

Resolution 1426 of December 1996 contains important legislation with respect to regional planning and development of the region given that Los Katíos National Park is included within the Darién Special Management Area. This legislation is an important legal instrument for the reorganization and restriction of activities to prevent colonization as well as monitor forestry activities. However, the development and implementation of these instruments first requires strengthening of regional environmental corporations (Corpourabá and Codechocó) and secondly, from a prior process of consultation and public participation, through which, on the basis of a clear understanding of the possibilities and constraints that characterize the region, defined by consensus strategies for the preservation and protection of natural and cultural heritage, and options for social and economic development to enable communities to achieve a decent standard of living.

Additional, more specific rules with respect to legal status and protection categories include: Law 002/59, which regulates aspects of the nation's forest economy and conservation of natural resources, and is the basis of the creation of the Pacific Forest Reserve; Decree 2811/74, particularly Articles 47, 48 and 49 pertaining to the creation of reserves and Decree 0622/77 of Decree 2811/74, which defines different classes of reserves, delimits and defines management criteria, and establishes systems for granting of concessions, rights and obligations of users, prohibitions, penalties, surveillance and control.

Frontier Zones

The Congress of the Republic passed Law 191 of 1995 that enacts provisions on "Border Zones", seeking primarily to protect human rights and improve the living conditions of communities living in these areas. In the case of the Sustainable Development Program of the Colombian Darién, this law provides the tools necessary to strengthen integration and cooperation with Panama, with the prior consent of the Chocó Department Assembly and Council of the four municipalities.

Part of this Law is dedicated to the preservation and sustainable exploitation of natural resources, providing an additional policy tool to advance environmental conservation and restoration. Article 4, for example, defines the municipalities of Unguía, Acandí, Juradó, Turbo, and Riosucio as border municipalities eligible for the benefits provided by the Act.

Article 8 in particular protects the traditional knowledge associated with genetic resources that indigenous communities have developed in the frontier areas. Thus, this rule enables the protection of botanical and zoological knowledge and promotes patenting with the Ministry of Development thereby potentially opening new sources of funds for indigenous communities.

Also relevant is Article 9, regarding "areas of parks and nature reserves and other special forest located in the border areas" and Article 20, which mandates special protection of the cultural manifestations of indigenous and local communities.

1.12 Ownership and Other Programs

1.12.1 Right of Use

Cocomasur (The Council of Black Afro-Colombian Communities of the Tolo River Basin and Southern Coastal Zone, a project proponent) holds Collective Title No. 1502 to the 13,465 ha project area. According to Article 6 of Law 70 of 1993, the community landholders who have been granted collective titles own the environmental services (including from forests and soil) generated on these lands. Article 15 of Law 70 establishes the rights to the sustainable use of renewable natural resources of collective territories. The community's exclusive access as collective owner to the use and exploitation of its territory also is established in Decree 2811 of 1974. (Refer to Annex M – Collective Title – Cocomasur Communities and Annex P – Colombia Law 70.)

1.12.2 Emissions Trading Programs and Other Binding Limits

This project is not subject to any emissions trading programs or other binding limits.

1.12.3 Participation under Other GHG Programs

This is the first and only application for this project to a GHG program.

1.12.4 Other Forms of Environmental Credit

This project was validated under the Climate, Community & Biodiversity (CCB) Standards (Second Edition, Gold Level) on February 9, 2012 by Scientific Certification Systems. Refer to Annex Q – CCB Standard Project Certificate and Annex R – CCB Standard Validation Report.)

1.12.5 Projects Rejected by Other GHG Programs

This project has neither applied for nor been rejected from any other GHG programs.

1.13 Additional Information Relevant to the Project

1.13.1 Leakage Management

PDR.96 A list of project activities designed to mitigate leakage.

The risk of leakage will be minimized through project activities designed to improve economic alternatives and incentives for potential agents of deforestation, thereby reducing the likelihood of land conversion outside of the project area. These activities include improved agricultural and silvopastoral practices, sustainable timber harvesting, reforestation, access to credit and markets for non-timber goods and services, education and awareness of ecosystem service values, and access to health and educational resources.

Leakage Management Activity	Description
Improved agricultural and silvopastoral practices	Community members will receive information and training on state of the art techniques to improve land productivity.

Sustainable timber harvesting	Community-led forest management plan will seek to balance environmental service values with sustainable harvesting of timber and non-timber forest products. Community cooperative will be formed to leverage existing knowledge, skills and resources within *Cocomasur*.
Reforestation	Targeted reforestation efforts will employ native species at risk of extinction and species of high value to communities and wildlife. Priority areas will include areas facing high conversion threat and areas of high conservation value.
Access to credit and markets for non-timber goods and services	Project funding will be leveraged to establish semi-formal community financial institutions to finance sustainable microenterprises and other income generating activities. Multi-stakeholder research on new economic and livelihood alternatives will be based on fair and sustainable resource use.
Education and awareness of ecosystem service values	Community members will participate in and learn about new knowledge and experience gained through biodiversity inventory and other monitoring.

Table 5: Mitigation actions planned for project area.

1.13.2 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of this project description. Some of the associated Annexes are confidential and have been noted as such in the table of contents.

1.13.3 Further Information

No further information is provided.

2 Application of Methodology

2.1 Title and Reference of Methodology

The project employs version 2.0 of the VM0009 Methodology for Avoided Deforestation. This methodology quantifies greenhouse gas removals generated from avoiding mosaic deforestation caused by subsistence agriculture. In the methodology, external drivers of deforestation can be used to inform the rate of deforestation for the baseline scenario.

2.2 Applicability of Methodology

PDR.1 For each applicability condition, a statement of whether it applies to the project. If the applicability condition does not apply to the project, justification for this conclusion.

PDR.2 Where applicability conditions apply, credible evidence in the forms of analysis, documentation or third-party reports to satisfy the condition.

For the Chocó-Darién Conservation Corridor REDD project, the following conditions apply:

1. *This methodology was developed for avoiding deforestation and assumes that degradation and deforestation occur as a result of land use conversion to non-forest. This methodology may be used if all the drivers and agents of deforestation are consistent with those described in Section 6 of this methodology and the end land use in the baseline scenario is non-forest.*

The VCS REDD VM0009 methodology was developed for avoiding deforestation resulting from land use conversion to non-forest. Degradation and deforestation are confirmed to have occurred in the reference area as a result of land use conversion to non-forest. According to a majority of the local community members who participated in the Participatory Rural Appraisal, the end land use in the baseline scenario is non-forest intended for cattle ranching or small-scale agriculture.

2. *Land in the project area has qualified as forest as defined by FAO 2010 or that of the definition of forest set by the residing designated national authority (DNA) for the project country for a minimum of 10 years prior to the project start date.*

The land within the project area has been forest for at least 10 years prior to the project start date, with forest defined as areas greater than 0.5 hectares, tree heights greater than 5 meters, and canopy cover greater than 10% (Global Forest Resources Assessment 2010). As observed in Landsat imagery from 2010, 11,755 ha (87.3%) of the 13,465 ha in the project area were forested. All previous imagery dating as far back as 1986 confirms that the project area contains at least as much forest as in 2010, as deforested land within the project area has only increased over time. Compliance with the height requirement is confirmed by the height data in the project inventory (heights were collected for all palms and some non-palm trees): mean palm height is 9.03 m with a median of 8.83 m, and mean non-palm tree height is 17.80 m with a median of 16.93 m. Forest canopy is, on average, almost entirely closed.

3. *In the case of baseline types that are type U, unplanned deforestation, deforestation exists at some point within 120 meters of the perimeter of the accounting area such that without the implementation of the project activity the accounting area would be immediately threatened by the agent of deforestation as of the project start date.*

Visual inspection of aerial imagery from the project start date was used to determine that there is extensive deforestation along the perimeter of the project accounting area. (Refer to Annex H — Map of Accounting Area.) Because the accounting area boundaries were delineated in order to exclude deforestation that already has occurred in the project area, these boundaries necessarily abut deforestation.

4. *In the case of baseline type U1, at least 25% of the project boundary is within 120 meters of deforestation and at least 25% of the reference area is adjacent to the project area.*

Of 123,010 of total project area perimeter, only 6,604 m of the project area boundary, or 5.3%, is adjacent to the reference area. Therefore, the baseline type cannot be Type U1.

5. *In the case of baseline type U2 at least 25% of the project boundary is within 120 meters of deforestation.*

Of 123,010 of total project area perimeter, 55,190 m of the project area boundary, or 44.37%, is is within 120 meters of deforestation. Therefore, the baseline type is Type U2.

6. *If foreign agents have been identified as an agent of deforestation, they are unlikely to shift their activities outside the activity-shifting leakage area.*

For the drivers of deforestation identified in the project area (ranching, selective logging, and subsistence and small-scale agriculture), foreign agents have not been identified as agents of deforestation. The primary agents of deforestation are the local Embera-Katio and Kuna peoples.

7. *The project area shall not contain organic or peat soil.*

The project area does not contain organic or peat soils (see section 3.1.4).

8. *For each baseline scenario, a reference area can be delineated for each baseline scenario that meets the requirements of section 6.7.1 of this methodology.*

For the project's baseline scenario, a reference area was delineated in order to determine what would have happened in the project area in the absence of project activities. The reference area is in the same region as (and adjacent to) the project area, and is influenced by the same drivers and agents of deforestation. Based on a spatial analysis, it was determined that the reference area contained as much forest as the accounting area at some point in time during the historic reference period (see section 2.4.5.1 of this document).

9. *As of the project start date, historic imagery of the reference area exists with sufficient coverage to meet the requirements of section 6.7.4 of this methodology.*

- Double coverage (at least 90% of the reference area visible in at least two historic images)

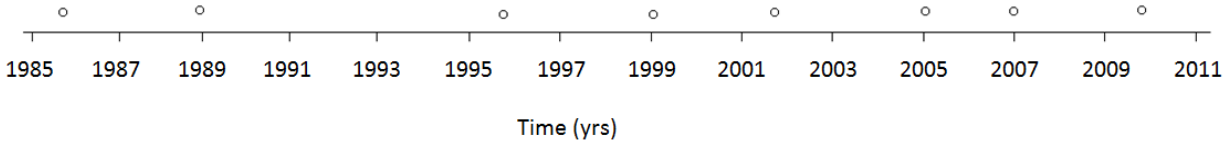
Double coverage analysis showed that 97.3% of the reference area meets the double coverage requirement. Only 41 of 1531 points were observed fewer than two times. Refer to Annex G — Map of Double Coverage.

- Minimum spatial imagery (30m resolution)

Point interpretation utilized Landsat imagery, which has a spatial resolution of 30 m.

- *Stationarity of time series of historic imagery*

The historic image dates are distributed, on average, across the entire historic reference period, as shown in the figure below. Therefore, the historic imagery appears to be stationary and the corresponding estimated time components of the image weights per equation [A.3] are unbiased.



- *Spatial registration: All imagery must be spatially registered to the same coordinate system with accuracy less than 10% Root Mean-Squared Error, on average across all images (Congalton, 1991). The accuracy of spatial registration is assessed empirically; each image is relative to other collocated images or a ground control point. Oblique imagery should be avoided to maintain accurate spatial registration.*

All Landsat images were spatially registered to the same coordinate system. In cases where Landsat images had to be geo-referenced, a RMSE of <10% was the baseline for accuracy.

10. *Project activities are planned or implemented to mitigate deforestation by addressing the agents and drivers of deforestation.*

Project proponents have implemented and will implement activities to mitigate deforestation and degradation by addressing the agents and drivers of deforestation. These activities, which are described in more detail in Section 1.8, are based around three themes:

- *Building governance capacity*, by raising awareness of collective identity and rights, developing criteria and procedures for resolving land disputes, constructing collective visions and strategic plans for land use, and improving information, education and communication for effective local governance;
- *Improving enforcement and management*, by demarcating territorial boundaries, establishing regular community surveillance to conserve existing forest, conducting ongoing monitoring of forest carbon stocks, promoting best practices for administrative and financial policies and processes; and,
- *Developing economic alternatives and incentives*, by improving agricultural and silvopastoral practices and technologies, developing plans and procedures for equitable and sustainable timber harvesting, assisting in the regeneration of deforested and degraded areas, identifying and increasing access to credit and markets for non-timber goods and services, educating and raising awareness of ecosystem service values, and increasing access to health and educational resources.

11. *The project proponent has access to the activity-shifting leakage area(s) and proxy area(s) to implement monitoring, or has access to monitoring data from these areas for every monitoring event.*

The project proponent (Anthrotect) has access to both the activity-shifting leakage area and proxy area, as evidenced by data collected from the leakage plots used to create the leakage emissions model and data collected from the proxy plots used to estimate residual carbon stocks.

12. *If logging is included in the baseline scenario and a market-effects leakage area is required, then the project proponent has access to the market-effects leakage area.*

A market-effects leakage area is not required because the project's drivers of deforestation are believed to be too small to materially affect the supply of market commodities. Logging activities are limited to selective harvests, and permits for such logging were only granted for 200 ha of the project area; 200 hectares are consequently conservatively removed from the portion of the project area eligible for crediting, the accounting area. Agricultural activities are limited to small-scale, subsistence agriculture which provides sustenance for nearby communities but does not reach beyond local markets. And while cattle ranching is considered the most important driver of deforestation in the project area, the scale of ranching activities in the project area is relatively small in relation to national and global beef markets. Only 0.5% of Colombia's cattle herds are found in the vicinity of the project area.

13. *If the Leakage Emissions Model is estimated after the project start date but before the end of the first monitoring period, then activity-shifting leakage has not occurred prior to the estimation of Leakage Emissions Model parameters.*

The Leakage Emissions Model was estimated in June 2012, after the project start date but before the end of the first monitoring period. Therefore activity-shift leakage has not occurred prior to the estimate of Leakage Emissions Model parameters.

PDR.3 Definition of forest used by the project proponent and its source.

The project proponent used the Food and Agricultural Organization's (FAO) definition of forest: area greater than 0.5 hectares, tree heights greater than 5 meters, and canopy cover greater than 10% (Global Forest Resources Assessment 2010).

2.3 Project Boundary

2.3.1 Gases

PDR.11 A list of the greenhouse gases considered.

The dominant method of deforestation in the Chocó-Darién region is conversion to subsistence agriculture by slash and burn techniques, with an end land use of pasture. As such, only carbon dioxide (CO_2) was selected as a source of greenhouse gas emissions in the project. Although methane (CH_4) and nitrous oxide (N_2O) are eligible for crediting (CH_4 and N_2O eligible because baseline scenario includes livestock grazing; CH_4 eligible because fire would have been used to clear land in the baseline scenario), both gases are conservatively excluded.

Pool	Sources	Inclusion	Justification
CO_2 (Carbon Dioxide)	Flux in carbon pools	Yes	Major pool considered in the project scenario
CH_4 (Methane)	Burning of biomass	No	Conservatively excluded
N_2O (Nitrous Oxide)	Burning of biomass	No	Conservatively excluded

Table 6: Justification for inclusion of various greenhouse gases.

2.3.2 Selected Carbon Pools

PDR.12 A list of the selected carbon pools.

Pool	Required	Included in Project?	Justification
Above-ground merchantable tree	Required	Yes	Pool considered
Above-ground non-merchantable tree	Required	Yes	Major pool considered
Above-ground non-tree	Optional	No	Conservatively excluded
Below-ground merchantable tree	Optional	Yes	Major pool considered
Below-ground non-merchantable tree	Optional	Yes	Major pool considered
Below-ground non-tree	Optional	No	Conservatively excluded
Below-ground biomass	Required	Yes	Major pool considered
Litter	No	No	Conservatively excluded
Dead wood	Optional	No	Conservatively excluded
Standing deadwood	Optional	No	Conservatively excluded
Lying deadwood	Optional	No	Conservatively excluded
Soil organic carbon	Optional	Yes	Major pool considered
Wood products	Required	No	*de minimus*

Table 7: Justification for inclusion of various carbon pools.

PDR.13 The definition and evidence to support the definition of a merchantable tree if the baseline scenario or project activities include logging.

The baseline does not include include logging of merchantable species. A logging permit was granted for a 200 ha portion of the Cocomasur land title, but this area was excluded from the project area. Merchantable species under a permit from the government are dependent on the species and diameter limits specified by the responsible Colombian agency.

In addition, it was determined that timber from selective logging in the baseline scenario was being used for fence posts. However, trees used for fence posts were limited to a handful of species, and to stems above 1 meters diameter at breast height (based on the results of a survey of woodworkers in the area). Analysis of the inventory shows that this pool is *de minimus* at approximately 9 tCO2e/ha.

Name	Average minimum DBH
Dipteryx oleifera	128
Terminalia Sp	100
Minquartia guianensis	120
Pouteria sp.	128

Table 8: Species and minimum diameters of trees used for fence posts

2.4 Baseline Scenario

2.4.1 Identifying the Agents and Drivers

PDR.17 A list of the agents and drivers of deforestation, including quantitative descriptions of agent mobilities.

The following agents, drivers, and agent mobilities were identified by means of a participatory rural appraisal (PRA) administered to community members in and around the project area in March 2012.

Agent of Deforestation	Associated Driver	Constraints to agent mobility
Ranchers	Cattle ranching	Moderately steep slopes, limited activity near the Colombia-Panama border
Sawyers and builders	Selective logging	Steep slopes, limited activity near the Colombia-Panama border
Farmers	Subsistence and small-scale agriculture	Moderately steep slopes, limited activity near the Colombia-Panama border

Table 9: Summary of agents and drivers of deforestation along with constraints to agent mobility.

PDR.18 A narrative describing the agents and drivers of deforestation.

The agents of deforestation are the members of the afro-Colombian communities surrounding the project area. In pursuit of the region's subsistence resources – including pasture for cattle ranching and land for agriculture, two significant drivers of deforestation – over 10% of the natural forest cover was converted during 2001-2010 alone.

The population of the municipality of Acandí was 10,455 people at the time of the 2005 National Census, which also determined that 57% of the population of the Chocó lived in rural settings relying on small-scale units of agricultural production, as well as hunting and fishing. Given the importance of fishing as a source of livelihood and as a means of transportation, communities are organized principally around the region's rivers.

The drivers of deforestation are listed in order of importance. All drivers of deforestation are legal land uses for community members, with the exception of selective logging, which requires a license granted by CODECHECO (though illegal selective logging also occurs).

- *Cattle ranching*: Cattle ranching in Colombia is largely extensive and uses very small inputs of labor and capital relative to the land requirements. A 2008 census of livestock in Colombia indicates that there are over 23 million head of cattle in the country, approximately 119,000 are located in Chocó (Cattle Census 2008). In interviews, local ranchers estimate that approximately 47,000 head are in the vicinity of the project area.
- *Subsistence and small-scale agriculture*: The majority of *chocoanos* depend on subsistence resources including agricultural products. In 2005, approximately 55% of the population of the Chocó region – which includes 1,661 households within 15 km of the project, according to the 2005 National Census and a 2012 local census – lived in rural settings working in small-scale units of production. Cultivation, particularly of rice, cassava, and plantain, is an important element in the subsistence strategies of households in the vicinity of the project area.
- *Selective logging*: Logging is an important source of income and local employment throughout the Chocó region. Selective logging occurs both illegally as well as via CODECHECO permits in the project zone. Increasing scarcity of timber resources in Colombia is putting increasing pressure on the forests of Chocó.

The drivers of deforestation have been documented to occur in and around the project area. These occurrences are attributable to a systematic lack of enforcement of property law and logging licenses (Ferguson 2010; INCODER 2005; UNDP 2011).

PDR.19 Descriptions of agents and drivers including any useful statistics and their sources.

A participatory rural appraisal (PRA) was conducted in March 2012 in order to identify agents and drivers of deforestation and the spatial constraints that govern their activity in the project area. The questionnaire was administered to 43 local community members, including farmers, laborers, merchants, and community leaders and authorities. (Refer to Annex S – Participatory Rural Appraisal Questionnaire and Annex T – Participatory Rural Appraisal Results.)

The PRA identified three main drivers of deforestation: land conversion for subsistence and small-scale agriculture and cattle ranching, and selective logging. Sawyers and builders performing the selective logging were cited most frequently as agents of deforestation, followed by livestock production and small-scale agriculture. Interviewees were asked to identify all important agents of deforestation.

	Sawyers / Builders		Cattle Ranchers	Agriculture
Most important agent	22 (51%)	2 (5%)	11 (26%)	7 (16%)
2nd most important agent	13 (23%)	3 (7%)	18 (42%)	8 (19%)
3rd most important agent	4 (9%)	5 (12%)	5 (12%)	15 (35%)
4th most important agent	5 (12%)	10 (23%)	3 (7%)	5 (12%)
5th most important agent	2 (5%)	3 (7%)	1 (2%)	2 (5%)
Total responses	43(100%)	23 (53%)	38 (88%)	37 (86%)

Table 10: PRA results summarizing reported agents of deforestation. Percentages were rounded and do not sum to 100%.

Although sawyers and builders were cited most frequently as agents of deforestation, when asked to identify the reason land is cleared (question 4 of the PRA), the majority of respondents indicated that trees are cut primarily to use the land for ranching or agriculture; selective logging, which tends to occur first, is merely in service of a predominant end land use of ranching or agriculture.

Driver	Number of Responses
Land conversion	31 (72%)
Wood products	9 (21%)
Wood product/land conversion	2 (5%)
No response	1 (2%)
Total response	43

Table 11: PRA results summarizing reported drivers of deforestation. Percentages were rounded and do not sum to 100%.

All respondents indicated that the agents of deforestation have been present in the region for at least 10 years, and over 90% indicated that agents have been present for more than 15 years. (See section 2.4.8.2 for a list of important events during the reference period that influenced agents and drivers of deforestation.)

The major constraint to agents of deforestation is steep slopes. The steepest slopes are located primarily in the *cordillera* along the western boundary of the project area. PRA respondents were asked to identify the steepest slope upon which they have observed deforestation activity, using qualitative categories (flat, hill, mountain, or cordillera). These were subsequently assigned quantitative percentages slope based on expert knowledge. The consensus was that most agents are not active in the cordillera, but are in all other slope categories. Even though some agents – including sawyers and builders as well as cattle ranchers – are said to be active on the steepest slope, these areas are conservatively excluded from the accounting area (see section 2.4.2 Delineating the Project Accounting Areas).

Slope constraints on agents of deforestation	Sawyers / Builders		Cattle Ranchers	Agriculture
Active on <10% slopes only (flat)	0 (0%)	0 (0%)	3 (7%)	2 (5%)
Active on <30% slopes only (hill)	2 (5%)	12 (28%)	13 (30%)	12 (28%)
Active on <65% slopes only (mountain)	13 (30%)	4 (12%)	19 (44%)	18 (42%)
Active at greater than 65% slopes (cordillera)	28 (65%)	3 (7%)	3 (7%)	5 (12%)

Table 12: PRA results summarizing slope constraints to deforestation.

Anecdotal evidence also suggested that agents are repelled to some extent from the Colombia-Panama border by security concerns. The PRA therefore included questions about the level of activity of agents in the border region, the results of which are presented in Table 13 (below). Because some agents are known to be active up to and beyond the border, it was determined that the border itself does not constrain agents of deforestation. However, given the steep terrain along the border, agents are of courses subject to the slope constraint described previously.

Border constraints on agents of deforestation	Sawyers or builders		Cattle ranchers	Agriculture
Stop 'well before the border'	14 (33%)	3 (7%)	16 (37%)	17 (40%)
Stop 'before the border'	12 (28%)	10 (23%	14 (33%)	11 (26%)
Active up to the border	6 (14%)	0 (0%)	2 (5%)	4 (9%)
Active beyond the border (i.e., in Panama)	9 (21%)	1 (2%)	0 (0%)	0 (0%)

Table 13: Border constraints on agents of deforestation.

2.4.2 Delineating the Project Accounting Areas

PDR.21 A digital (GIS-based) map of the accounting areas, including aerial or satellite imagery showing that they are completely forested as of the project start date and 10 years prior to the project start date.

Aerial imagery confirms that the project accounting area is completely forested as of the project start date. Refer to Annex H — Map of Accounting Area and Annex I — Map of Accounting Area (2001 Imagery).

PDR.22 Justification and area of the selected accounting areas.

A project accounting area was delineated to represent the portion of the project area that is both forested and subject to deforestation. The accounting area was selected by first excising non-forested portions of the project area. Non-forest was digitized using two Landsat 7 images, one from August 27, 2011 and one from July 7, 2010.

Project proponents considered additional constraints posed by steep slopes in the project area as well as the Colombia-Panama border. The thresholds for these constraints were determined based on results from the PRA (see section 2.4.1 Identifying the Agents and Drivers).

A majority of responses (72%) indicated that agents of deforestation are able to access land in the cordillera. During the course of the inventory measurement process, pasture was observed on slopes as steep at 70%. Areas steeper than 65% (33 degrees) were conservatively excluded from the accounting area.

Most respondents (82%) also stated that agents stop "before" or "well before" the Colombia-Panama border, which is also the western boundary of the project area, due to perceived security concerns. However, some agents are active near the border and even across the border into Panama. After further investigation, it was determined that while the steep slopes that are common along the border do hinder agents of deforestation, the border itself does not inherently deter agents. Therefore, the accounting area extends to the Colombia-Panama border, subject to the slope constraint described previously.

A logging title exists within the project area comprising 200 ha. This was subtracted from the project accounting area determined using all other constraints.

The accounting area comprises 9,910 ha, or approximately 78% of the project area.

2.4.3 Baseline Types

PDR.26 If Type U2 is selected, a spatial analysis of the project area showing that 25% of the perimeter is within 120 meters of deforestation that occurred within 10 years prior to the project start date.

54,899 m of 96,994 m (56.6%) of the project perimeter is deforested, so the baseline type is U2. (Refer to Annex K – Map of Project Area Boundary.) The baseline type is not U1 as 25% of the perimeter does not abut the reference area. The baseline type is not U3 as more than 25% of the project perimeter is deforested.

PDR.27 If Types U1, U2 or U3 is selected, a spatial analysis of the project area showing that it is within 120 meters of deforestation that occurred within 10 years prior to the project start date.

Baseline Type U2 is applicable to this project. As confirmed by the results of the perimeter analysis, the project area is within 120 meters of deforestation. (Refer to Annex K – Map of Project Area Boundary.)

2.4.4 Delineating Proxy Areas

PDR.28 A map of the delineated boundaries.

Refer to Annex A – Map of Project Area.

PDR.29 Maps of the landscape configuration, including:

a. Topography (elevation, slope, aspect);

Refer to Annex C – Map of DEM, Annex D – Map of Slope, and Annex E – Map of Aspect.

b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);

Refer to Annex B – Map of Land Cover.

c. Access points;

Refer to Annex B – Map of Land Cover.

d. Soil class maps (if available);

e. Locations of important markets;

Refer to Annex B – Map of Land Cover.

f. Locations of important resources like waterways or roads; and

Refer to Annex B – Map of Land Cover.

g. Land ownership/tenure boundaries.

High-quality maps of land ownership do not exist for the proxy area. These lands are predominantly owned and controlled by smallholders.

PDR.30 A narrative describing the rationale for selection of proxy area boundaries.

Proxy areas were delineated to estimate residual carbon stocks in the baseline scenario. The proxy areas are outside of the project and reference areas and were selected according to the following criteria: forest state, proximity to the project area, and slope. In addition, proxy areas could include only areas accessible to sampling teams in order to install and access plots; the major constraint for accessibility was landowner permission. By definition, the proxy area should contain post-conversion land, so only areas that were visibly deforested in available Landsat imagery were considered. In order to ensure that the proxy area was subjected to the same agents and drivers of deforestation as the project area, only lands within the municipality of Acandí (*i.e.*, in proximity to the project area) were considered. The proxy areas were further confined to areas with slope similar to that of the accounting area to ensure that they represent areas where agents of deforestation are likely to be present. A slope raster generated from an ASTER digital elevation model (DEM) was used for this analysis.

PDR.31 Results of a spatial analysis to demonstrate the proxy area is not forested, on average, as of the project start date.

The proxy area was delineated to exclude forest discernible in Landsat imagery from August 27, June 8, April 21, April 13, and March 12, 2011, and September 25, July 7, and June 21, 2010. The majority of classification was performed using true color, in which deforestation was easily discernible. In cases where forest state was difficult to determine, other band combinations were employed. (See section 2.4.5.8 for a more detailed description of classification using Landsat imagery.)

2.4.5 The Baseline Emissions Models

2.4.5.1 Delineating Reference Areas

PDR.36 A map of the delineated boundaries, demonstrating that the reference area is held by the identified baseline agent or agents and does not include the project area.

Refer to Annex B – Map of Land Cover.

PDR.37 Maps of the landscape configuration, including:

a. Topography (elevation, slope, aspect);

Refer to Annex C — Map of DEM, Annex D — Map of Slope, and Annex E — Map of Aspect.

b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);

Refer to Annex B – Map of Land Cover. Land use and land cover was analyzed using Landsat imagery from 2010.

c. Access points;

Refer to Annex B – Map of Land Cover.

d. Soil class maps (if available);

e. Locations of important markets;

Refer to Annex B – Map of Land Cover.

f. Locations of important resources like waterways or roads; and

Refer to Annex B – Map of Land Cover.

g. Land ownership/tenure boundaries.

Refer to Annex B – Map of Land Cover.

PDR.38 A description of the rationale for selection of reference area boundaries.

A reference area was selected to observe historical deforestation that has taken place near the project area. The reference area is in the same region as the project area and is similar to the project area in regards to agents and drivers of deforestation, socio-economic conditions, cultural conditions and landscape configuration. In order to minimize variation in political constraints on deforestation, and to maintain a relatively constant distance from agents and drivers of deforestation, the reference area was placed in the same municipality as the project area, Acandí. Because of the proximity to the same community population centers, a common set of socio-economic and cultural conditions apply to both the project area and reference area.

The geography of Acandí includes a wide range of elevations, from flat coastal lowlands to rugged *cordillera* along the Panamanian border. Because the project area is quite mountainous, it was determined that the reference area also must contain mountainous terrain. The area directly north of the project area is one of the only mountainous areas—and certainly the largest—in Acandí outside the project area and therefore affords similar access to agents and drivers of deforestation. Furthermore, the area is bound on the north and west by the Panamanian border, ensuring that any effects on deforestation presented by proximity to the border are common to both areas.

In order to constrain the reference area to land that is comparable to the project area in terms of slope and elevation, the 50 meter contour line was chosen to serve as the remaining boundary. 50 meters is

approximately the elevation at which slopes increase dramatically, thus rendering it a good division between flat and rugged land. Additionally, to reflect the slope constraint applied to the accounting area, areas steeper than 65% (33 degrees) as observed in an ASTER GDEM-generated slope raster were excluded from the reference area.

PDR.39 Results of a spatial analysis to demonstrate the reference area had as much forest as the project accounting area at some point in time during the historic reference period.

Of 1531 points in the reference area, 862 (56%) were classified as forest in 2010. Conservatively applying the value of 56% to the 18,721-ha reference area indicates that forest covered least 10,541 ha of the reference area. (The amount of forest in the reference area was likely greater than 56%, however, since 387 points were classified as "Cloud/Shadow" or "No Image.") The project accounting area contains only 9,910 ha.

2.4.5.2 Defining the Historic Reference Period

PDR.42 Established reference period boundaries.

Based on available cloud-free historical Landsat imagery of the reference area, the reference period selected was 1986-2010. No Landsat imagery was found prior to 1986 that was reasonably cloud-free.

PDR.43 A list of available historic imagery for the reference area.

Landsat 7, June 21, 2010
Landsat 7, June 13, 2007
Landsat 7, June 7, 2005
Landsat 7, July 1, 2002
Landsat 5, July 17, 1999
Landsat 5, July 24, 1996
Landsat 4, October 1, 1989
Landsat 5, August 20, 1986

PDR.44 A timeline of important events as they relate to the agents and drivers of deforestation.

Time Period	Event
1993	Law 70 of 1991 Constitution provides for granting of collective land titles to Afro-descendant communities in the Colombia Pacific.
1995-2002	Illegal armed actors cause widespread displacement of rural populations in the municipality of Acandí.
2005	National government awards Collective Title No. 1502 to *Cocomasur* in recognition of their longstanding presence in Acandí.
2007	*Cocomasur* completes inventory of commercially valuable timber species with their land title.
2007	Forestry agency grants *Cocomasur* a logging permit for 10,000 cubic meters of harvest over 1 year in 200 ha of the land title, with the possibility of

	harvesting 100,000 cubic meters in 5 years.
2010	*Cocomasur* General Assembly approves the Chocó –Darién Conservation Corridor REDD Project.
2011	Acandí community commences forest monitoring patrols in the project area.

Table 14: Important events relating to agents and drivers of deforestation.

PDR.45 Narrative rationale for the selection of the reference period.

The reference period was chosen to enable determination of the cumulative proportion of deforestation over time. The beginning of the reference period was set at 1986, when most flat, low-lying land in the reference area was already deforested but had not extended significantly into the moderately sloped land similar to the project area. To capture the most recent deforestation rate possible, the reference period was extended through 2010.

In order to eliminate seasonal variation in vegetation reflectance, only imagery from roughly the same time of year was selected for potential use. The season selected—the one with the most cloud-free imagery—was June through August. The oldest cloud-free image available during this time was from 1986 and the most recent from 2010. Though not strictly within the same seasonal period, one image from October was selected to fill a significant temporal gap.

2.4.5.3 Selecting Historical Imagery

PDR.46 A map of the reference area showing the area of "double-coverage."

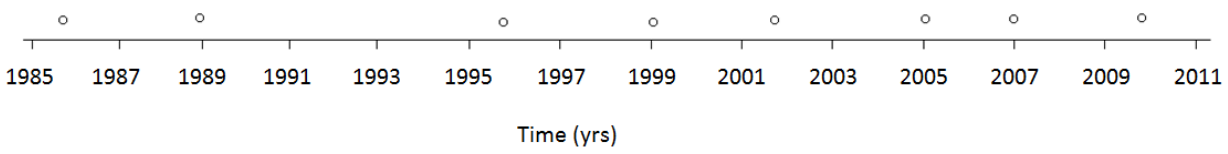
Refer to Annex F – Map of Point Interpretation.

PDR.47 Quantification of "double coverage"(greater than 90%).

Double coverage analysis showed that 97.3% of the reference area is visible in at least two historic images during the reference period, greater than the 90% requirement. Only 41 of 1531 points were observed fewer than two times. Refer to Annex G – Map of Double Coverage.

PDR.48 A line plot of the historic image dates to confirm stationarity.

The historic image dates are distributed, on average, across the entire historic reference period, as shown in the figure below. Therefore, the historic imagery appears to be stationary and the corresponding estimated time components of the image weights per equation [A.3] are unbiased.



PDR.49 Evidence that all image pixels are not more than 30m x 30m.

Point interpretation utilized Landsat imagery, which has a spatial resolution of 30 m.

PDR.50 Empirical evidence that imagery is registered to within 10% RMSE, on average.

All Landsat images were spatially registered to the same coordinate system. In cases where Landsat images had to be geo-referenced, a RMSE of 5.5% was achieved. The average error was 1.3 meters beyond the pixel diagonal and the average RMSE was 2.3 meters (or 5.5%) beyond the pixel diagonal.

2.4.5.4 Determining Sample Size

PDR.51 The sample size.

The sample size for analyzing historical deforestation was selected to achieve the necessary precision to fit the logistic function and, in turn, determine the deforestation parameters. A pilot sample of 204 points in each of five years (for a total of 1020 observations) was analyzed to determine a rough estimate of the population variance. Based upon this analysis, it was determined that in order to estimate the deforestation parameters within +/- 15% on average, the point interpretation required a sample of 1531 points observed over eight years of historical imagery (for a total of 12248 observations).

2.4.5.5 Sampling Deforestation

Table 15 summarizes the results of visual point interpretation of 1531 points in each of eight years.

Year	Forest	Non-Forest	Cloud/Shadow	No Image	Total
1986	1100	276	155	0	1531
1989	724	196	611	0	1531
1996	743	239	549	0	1531
1999	663	230	638	0	1531
2002	751	212	568	0	1531
2005	612	147	499	273	1531
2007	789	181	223	338	1531
2010	862	282	178	209	1531

Table 15: Summary of point interpretation.

PDR.52 A map of the reference area showing the sample point locations.

Refer to Annex F – Map of Point Interpretation.

2.4.5.6 Discarded Sample Points

Of 12248 total observations (representing 1531 sample points over eight years), a total of 6177 observations were discarded: 4241 observations were unobservable due to cloud cover or image striping, and 2416 observations (302 points over 8 years) were initially observed as non-forest. Of these 6657 observations, 480 were both unobservable and initially non-forest. Table 16 summarizes the observations discarded from the Biomass Emissions Model.

Year	Unobservable only	Initial Observation of Non-Forest only	Both Unobservable and Initially Non-Forest	Total Points Discarded
1986	129	276	26	431
1989	501	192	110	803
1996	493	246	56	795
1999	597	261	41	899
2002	515	249	53	817
2005	703	233	69	1005
2007	481	222	80	783
2010	342	257	45	644

Table 16: Discarded observations.

2.4.5.7 Parameterizing α, β and θ

The deforestation parameters α, β were fit using the sample deforestation data from the reference area. When fit to a logistical function, sample deforestation data yielded the following values for **α** and **β**:

Parameter	Value
α	-2.168942
β	0.000117

2.4.5.8 Minimizing Uncertainty

PDR.57 A protocol for interpreting forest state from imagery.

Point interpretation was performed according to the VM0009 methodology's guidance for analyzing deforestation in the reference area.

Landsat imagery—including Landsat 4, 5, and 7—was used to classify forest state. The majority of classification was performed using true color, or {3,2,1} (where Band 3 is red, 2 is green, and 1 is blue). (Note: in the notation {x,y,z}, Band x is displayed is red, Band y is displayed as green, and Band z is displayed as blue.) In cases where forest state was difficult to determine, other band combinations were employed, most notably {4,2,1} (where 4 is near infrared) but also {4,3,2}, {7,4,2} (where 7 is far infrared), {5,2,1} (where 5 is mid-range infrared), and {NDVI,2,1} (where NDVI is Normalized Difference Vegetative Index).

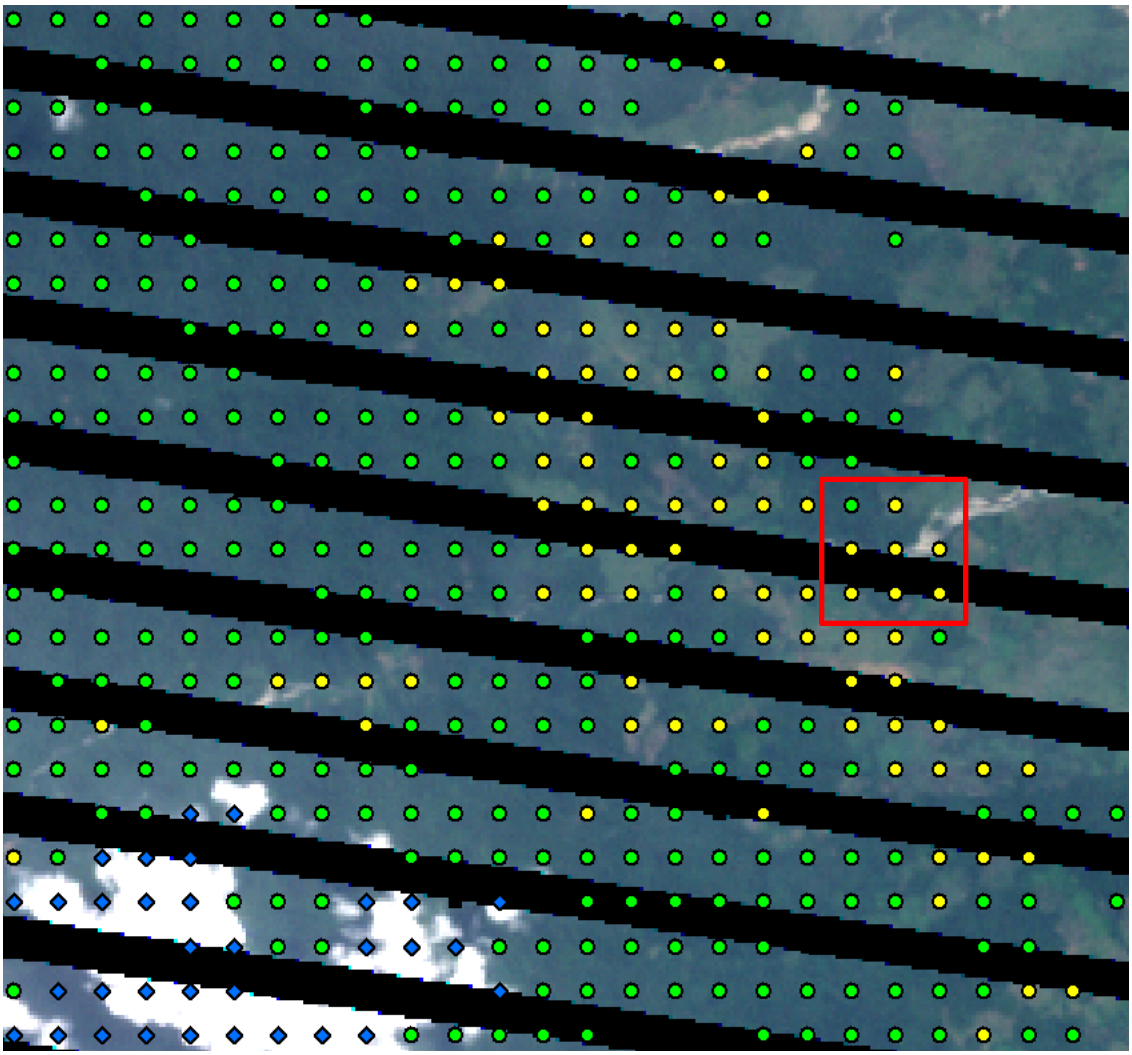


Image 1: Portion of point interpretation grid for analyzing deforestation in reference area.

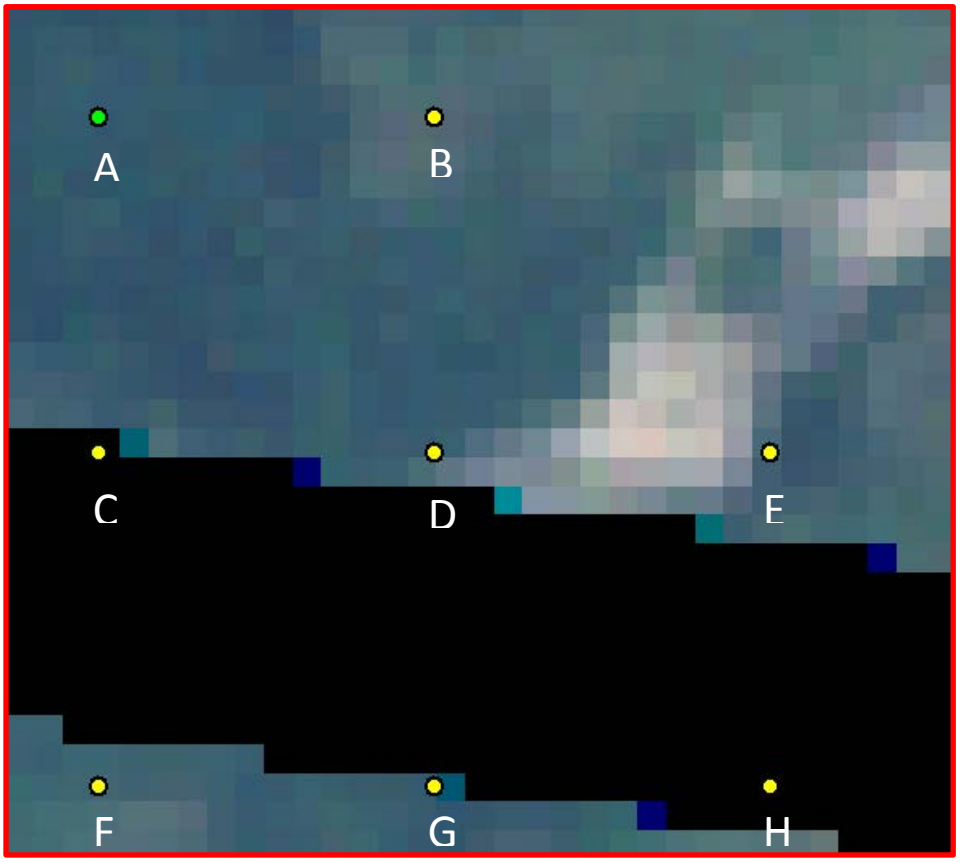


Image 2: Detailed excerpt of point interpretation grid.

In general, deforestation was easily discernible in true color; brown and light green areas (*e.g.*, Points B and F in Image 2), abrupt edges, and other unusual reflectance patterns were indicative of anthropogenic disturbances and were classified as non-forest. If alternative band combinations didn't clarify ambiguous points, the surrounding area was taken into account to provide context (*e.g.*, point G in Image 2). Naturally occurring non-forest such as water bodies or beaches were also classified as non-forest (points D and E in Image 2).

Each point was classified based on the pixel in which it fell. In most cases, forest state was consistent enough across neighboring pixels that single pixel-level analysis was not necessary (Point A). In cases where a point fell on the very edge of non-forest, though, the pixel in which the point fell was observed to determine whether it contained non-forest. If the pixel's reflectance was clearly within the gradient between forest and non-forest (*i.e.*, a "mixel" as in points D and E in Image 2), it was classified as non-forest.

Where a point fell on a cloud, cloud shadow, or No Data stripe (present in post-2002 Landsat 7 images), it was often possible to interpolate forest state based on the surroundings. If the surrounding area was predominantly one state (Point H), or a patch visible next to the obstruction would almost certainly extend into the obstruction and include the point (*e.g.*, point C in Image 2), forest state was

interpolated. If, however, there was more than a small amount of uncertainty, the point was classified as cloud/shadow or no image accordingly.

PDR.58 The results of an independent check of the interpretation.

The accuracy of the point interpretation was verified by performing an independent check of 50 points in each of the eight years of historical imagery (for a total of 400 observations). Of these 400 observations, 12 observations could not be checked because of cloud cover or Landsat 7 band striping. Of the remaining observations, 6 observations were found to be incorrectly identified. The resulting error rate for the point interpretation is 1.5% (6 incorrect out of 388 observations). We concluded that there were no systematic errors in how the point interpretation was performed.

PDR.59 Evidence that systematic errors, if any, from the independent check of the interpretation were corrected.

Based on the independent check described above (PDR.58), the interpretation was determined to have no systematic errors.

2.4.5.9 Estimating Uncertainty

Standard error for α and β are as follows:

Parameter	Standard Error
α	6.810230
β	0.001582

The estimated standard deviation of the observations per equation [F.13] is 0.005826. This quantity is used to determine the uncertainty of the logistic function every time it is applied to determine credit generation though baseline reevaluation.

2.4.6 Determining γ

PDR.69 The project shift parameter γ as the number of days between the beginning of the historical reference period and the project start date.

The historical reference period began on August 20, 1986 and the project start date was October 18, 2010. The length of the period between these dates is 8827 days. This parameter is not used as the baseline type is U2.

2.4.7 Determining q

PDR.70 The parameter q as the number of days between the onset of degradation and the beginning of deforestation.

Although selective logging is known to occur as a part of the cascade of deforestation in the project accounting area, emissions resulting from degradation in advance of complete deforestation are conservatively excluded from the carbon accounting. Accordingly, the *q* parameter is given a value of zero.

2.4.8 Determining r_U

PDR.72 The parameter $\hat{r}_U$ as the area of non-forest in the project area as of the project start date that was forest ten years prior to the project start date.

The value calculated for the r_u parameter is 43.4%.

PDR.73 Description of how $\hat{r}_U$ was obtained.

r_u was determined using the ratio of deforested perimeter to threatened perimeter of the project area (the first of two permissible methods for calculating r_u). The perimeter was analyzed by buffering the project area boundary by 120 meters and inspecting pixels at two points in time.

PDR.74 Results of GIS analysis to determine or measure $\hat{r}_U$ in the project area including the dates of images used to identify deforestation.

Based on examination of Landsat 7 images from July 7 and September 25, 2010, 18,991 m of project area perimeter were found to be within 120 m of deforestation. Threatened perimeter was calculated by removing deforested perimeter and perimeter occupying slopes steeper than the 65% constraint; slope was generated using an ASTER Global Digital Elevation Model. 43,382 m of project area perimeter was designated as threatened. The ratio of deforested to threatened perimeter is 0.434, or 43.3%. See Annex K for a map of threatened and deforested perimeter of the project area.

2.4.9 The Decay Emissions Model

2.4.9.1 Determining λ_{SOC}

2.4.9.1.1 Default Values for λ_{SOC}

The default value of 0.2 was used for the λ_{SOC} parameter, which characterizes the decay of soil organic carbon over time.

2.4.10 Baseline Scenarios for Selected Carbon Pools

PDR.84 A qualitative description of the baseline scenario for each selected carbon pool.

Above-ground merchantable trees (AGMT): AGMT is assumed to be removed, burned or converted to fuel wood in the baseline scenario, or cut and the merchantable biomass converted to wood products. The residual AGMT biomass remaining after agents have acted upon the forest in the baseline scenario was determined using data collected from plot measurements in the proxy area. The proxy area sampling indicates that 0 tCO2e/ha of carbon remains in AGMT after a deforestation event. For accounting purposes, this pool was combined with AGOT (see Section 2.3.2).

Above-ground non-merchantable trees (AGOT): AGOT are assumed to be removed, burned or converted to fuel wood in the baseline scenario. The residual AGOT biomass remaining after agents have acted upon the forest in the baseline scenario was determined using data collected from plot measurements in the proxy area. The proxy area sampling indicates that 53 tCO2e/ha of carbon remains in AGOT after a deforestation event.

Below-ground merchantable trees (BGMT): The below-ground portion of residual biomass for merchantable trees in the baseline scenario was determined using a ratio of 0.37 (the IPCC default root-to-shoot ratio for wet tropical forests) of residual above-ground biomass.

Below-ground non-merchantable trees (BGOT): The below-ground portion of residual biomass for non-merchantable trees in the baseline scenario was determined using a ratio of 0.37 (the IPCC default root-to-shoot ratio for wet tropical forests) of residual above-ground biomass. For accounting purposes, this pool was combined with BGOT (see Section 2.3.2).

Below-ground biomass (BGB): The below-ground biomass for the project and proxy areas was determined by applying the IPCC default root-to-shoot ratio to measured above- ground biomass.

Soil organic carbon (SOC): SOC is assumed to deplete to the SOC levels measured in the proxy area, 403.8 tCO2e/ha. The depletion of SOC stocks occurs according to the decay function, which employed the default value (0.2) for the lambda term.

Wood Products (WP): Biomass remaining in WP is assumed to be restricted to a portion of AGMT biomass removed in the baseline scenario. Because fence posts harvested from the project area were determined to be *de minimus*, the biomass remaining in WP is assumed to be zero (see Section 2.3.2).

2.5 Additionality

PDR.91 A list of alternative land use scenarios to the project.

The most likely land use scenario is characterized by a cascade of degradation that includes multiple drivers and ultimately results in an end land use of pasture for cattle ranching. While selective logging and slash and burn agriculture typically observed first, the succession to complete land clearance for cattle ranching is relatively consistent and rapid.

Selective logging is known to occur in the vicinity of the project area as the scarcity of timber resources in Colombia puts increasing pressure on the forests of the Chocó. Following the selective timber harvesting, slash and burn agriculture is more likely to occur. Small-scale agriculture is an important element in the subsistence strategies of households in the vicinity of the project area, who have limited access to commercial opportunities and export markets. Important crops include rice, cassava, and plantain.

As crop production declines due to soil erosion and nutrient loss, conversion to pasture for ranching is an increasingly likely occurrence. Ranching in Colombia is largely extensive and requires very small

inputs of labor and capital relative to the land requirements. Colombia has over 24 million head of cattle (the fourth largest herd in Latin America), of which an estimated 47,000 head are found in the vicinity of the project area.

In the absence of the project, this pattern of deforestation and degradation – starting with selective logging and proceeding to slash and burn agriculture and eventual cattle pasture – is likely to continue unchecked. The compound damage to the ecosystem from the conversion of forest to pasture would, in turn, affect habitat and land use patterns as farmland becomes more vulnerable to more frequent and intense flooding. Erosion and silt accumulation in rivers from forest destruction would put further pressure on livelihoods. Without investment in community-based resource management, it is unlikely that current community governance would be capable of preventing the encroachment and illegal land-clearing that is taking place in the project area.

PDR.92 Justification for the selected baseline scenario. This justification can include expert knowledge, results from the participatory rural appraisal and ex-ante estimates of avoided emissions (see sections 2.4.1 and 3.4.4).

The majority of respondents to the Participatory Rural Appraisal (PRA) indicated that trees are cut primarily as a means to create agricultural land or pasture. Although selective loggers tend to be the first agents to impact a particular parcel of forest, their activities are largely in service to subsequent land uses including cattle ranching and agriculture. (For more detailed information on agents and drivers of deforestation, please see section 2.4.1.)

PDR.93 An investment or barriers analysis proving that the project is not the most economical option

The project proponents assessed the project's additionality using the VCS Tool for the Demonstration and Assessment of Additionality (VT0001, version 3.0). Investment and barrier analyses determined that the project is additional.

The investment analysis (simple cost analysis - option 1 in the VCS Tool) demonstrated that the project produces no substantial financial benefits for project proponents other than VCS-related revenue. Although additional revenue is expected from micro-enterprises resulting from project activities (see Table 4 in section 1.8), this revenue is expected to be very small in comparison to both project implementation costs and VCS-related revenue. Furthermore, start-up capital for the micro-enterprises will come from carbon financing. Therefore the micro-enterprises would not be initiated in the absence of VCS credit issuance and they do not represent a viable stand-alone alternative source of revenue.

A barrier analysis, performed as an extension to the investment analysis, found that drivers of deforestation enjoy much lower investment and institutional barriers due to the maturity of the logging, cattle ranching, and agriculture industries in Colombia. Technology, labor and other inputs has led to strong markets for these industries as well. Barriers that prevent the implementation of project activities include:

- Investment barriers: Lack of access to credit and commercial financing for project activities. The institutions at the regional, national and international levels for conservation finance remain underdeveloped. For this reason, forest conservation activities in Colombia typically are carried out by large non-profits or the public sector.
- Technological barriers: Equipment required for the implementation of project activities, such as satellite and airborne remote sensing, GPS units, clinometers, and other measuring devices are not available in the Chocó.
- Barriers due to prevailing practice: This project is the first of its kind in Colombia. No project of this type is currently operation in the Chocó region or anywhere else in the country.
- Barriers relating to land tenure and property rights: Communal land ownership with a hierarchy of rights for different stakeholders limits the incentives to undertake project activities. Although there exist property rights in relation to natural resource products and services, they are neither clearly defined nor well-regulated.

Both forest conservation and the drivers of deforestation face similar barriers with regard to:

- Social conditions: demographic pressure due to local population growth, social conflict among groups in the surrounding region, widespread illegal practices such as property encroachment and timber extraction;
- Land tenure: absence of clearly defined and regulated property rights in relation to natural resource products and services; communal land ownership with a hierarchy of rights for different stakeholders limits the incentives to undertake project activities;
- Markets, transport and storage: unregulated and informal markets for products and services related to the project activity prevent the transmission of effective information; remoteness of project activities and undeveloped road and infrastructure incur large transportation expenditures.

OR

PDR.94 A common practice analysis including a list of project activities and the drivers of deforestation that they address.

There are no projects or activities similar to those proposed by this project underway in the Chocó-Darién region. Therefore project activities can be considered additional.

PDR.95 Evident compliance with the minimum requirements of the aforementioned VCS tool. This evidence may be the same as the evidence provided to meet reporting requirements listed in section 2.2.

The project proponent has demonstrated that the project complies with all the applicability conditions of the methodology described in section 2.2, which necessarily affirms the project's compliance with VCS requirements.

2.6 Methodology Deviations

2.6.1 Sample Design in the Project Area

Given the steep slopes and rugged terrain of the project area, the sampling design clustered sample plots along transects, thereby reducing travel time to and from measurement plots. Standard errors for this inventory design were calculated using a cluster sample modified to include plot allocation with a probability proportional to slope.

This design is a deviation to monitoring from the selected methodology which assumes plots are allocated according to a simple random sample. The estimators for the complex design were taken from Lohr 1999.

2.6.2 Finite Population

The estimators provided in the selected methodology assume that the carbon stocks are finite and hence include a finite population correction factor. The finite population correction factor was not to estimate carbon stocks or degradation. This is conservative because estimators based on infinite populations are relatively less efficient than those based on assumptions of finite population.

3 Quantification of GHG Emission Reductions and Removals

3.1 Baseline Emissions

Baseline emission were calculated using baseline type U2 per VM0009.v2, a mosaic deforestation configuration without a spatial model. Greater than 25% of the project perimeter is within 120 meters of deforestation that occurred within 10 years of the project start date. The baseline emissions for any given monitoring period are estimated using equation F.15 in VM009.2,

$$E_{\mathrm{B}\,\Delta}^{[m]} = E_{\mathrm{B}\,\Delta\,BM}^{[m]} + E_{\mathrm{B}\,\Delta\,SOC}^{[m]} - C_{\mathrm{B}\,\Delta\,BGB}^{[m]} - C_{\mathrm{B}\,\Delta\,DW}^{[m]} - C_{\mathrm{B}\,\Delta\,SOC}^{[m]} - C_{\mathrm{B}\,\Delta\,WP}^{[m]}$$

3.1.1 Estimating Baseline Emissions from Biomass $E_{B\,\Delta\,BM}^{[m]}$

Baseline emissions from biomass are estimated using equation F.4 in F.15 in VM009.2, where

$$BEM_{U2,3}(c_P, c_B, t, x) = \frac{A_{PAA}(c_P - c_B) + \frac{HA_{U2,3}(c_P, c_B)t}{t_{PL}}}{1 + e^{\ln\left(\frac{1}{r_U}\right) - \beta(t+0.5q) + \boldsymbol{\theta}(x_0 - x)^T}} - HA_{U2,3}(c_P, c_B)$$

And cumulative emissions estimated as

$$E_{B\,BM}^{[m]} = BEM_{U2,3}\left(c_{P\,BM}^{[m=0]}, c_{B\,BM}^{[m]}, t^{[m]}, x^{[m]}\right)$$

3.1.2 Estimating Baseline Emissions from SOC $E^{[m]}_{B\,\Delta SOC}$

Baseline emissions are estimated using VM0009.2 equation F.7, where

$$SEM_{U2,3}(c_P, c_B, t, x) = \frac{A_{PAA}(c_P - c_B)}{1 + e^{\ln\left(\frac{1}{r_U}\right) - \beta t + \boldsymbol{\theta}(x_0 - \boldsymbol{x})^T}}\left[1 + \frac{1}{1 + e^{\ln\left(\frac{1}{r_U}\right) + \boldsymbol{\theta}\boldsymbol{x}_0^T}}\right] - \frac{A_{PAA}(c_P - c_B)}{1 + e^{\ln\left(\frac{1}{r_U}\right) + \boldsymbol{\theta}\boldsymbol{x}_0^T}}$$

And cumulatively as

$$E^{[m]}_{B\,SOC} = SEM_{U2,3}\left(c^{[m=0]}_{P\,SOC} c^{[m]}_{B\,SOC}, t^{[m]}, x^{[m]}\right)$$

3.1.3 Estimating Carbon Not Decayed in BGB $C^{[m]}_{B\,\Delta\,BGB}$

Carbon not decayed in BGB is estimated using equation F.10 in VM009.2, where

$$DEM_{DW,BGB}\left(E^{[m]}_{B\,\Delta}, t, t^{[m-1]}, t^{[m]}\right) = \frac{E^{[m]}_{B\,\Delta}}{3650(1 + e^{t-365})}\left(3650 + t^{[m]} - t + \frac{t^{[m]} - t^{[m-1]}}{2}\right)$$

3.1.4 Estimating Carbon Not Decayed in SOC $C^{[m]}_{B\,\Delta SOC}$

Carbon not decayed in BGB is estimated using equation F.9 in VM0009.2, where

$$DEM_{SOC}\left(E^{[m]}_{B\,\Delta}, t, t^{[m-1]}\right) = E^{[m]}_{B\,\Delta} - \frac{365E^{[m]}_{B\,\Delta}}{\lambda_{SOC}(t - t^{[m-1]})}\left[\frac{\lambda_{SOC}(t - t^{[m-1]})}{365} + e^{-\frac{\lambda_{SOC}(t - t^{[m-1]})}{365}} - 1\right]$$

3.1.5 Estimating Cumulative Emissions from AGMT

Biomass in AGMT was found to be *de minimus* in the baseline and was therefore not included. Total AGMT biomass is equivalent to approximately 65,440 tCO_2e, or 2% of total gross emissions over the lifetime of the project. Emissions from merchantable trees are included in AGOT.

3.1.6 Determining Carbon Stored in WP

Carbon stored in WP was determined to be *de minimus* based on the analysis of cumulative emissions from AGMT (section 3.1.5 above) and was not included.

3.2 Project Emissions

Project emissions are calculated as F.41 in VM0009.2, where

$$E^{[m]}_{P\,\Delta} = E^{[m]}_{P\,\Delta\,BRN} - C^{[m]}_{P\,\Delta\,WP} + A_{PAA}\left(c_P^{[m-1]} - c_P^{[m]}\right)$$

3.2.1 Calculating Emissions from Changes in Project Stocks

Changes in project stocks are calculated as the difference in project stocks in each stratum between the current and prior monitoring periods. Stocks that are lost to burning, wood products, and leakage are accounted using the procedures and equations below.

3.2.2 Calculating Emissions from Burning

Project emissions from burning are calculated as

$$E_{P\,\Delta\,BRN}^{[m]} = \left(\frac{44}{12}\right) 0.66 \sum_{b \in \mathcal{W}^{[m]}} r_{CF\,b}\, B_{b^{[m]}}$$

3.2.3 Determining Carbon Stored in WP

Carbon stored in wood products are accounted using appendix C in VM009.2, where

$$C_{P\,\Delta\,WP}^{[m]} = (1-w) \sum_{ty \in \mathcal{T}} C_{P\,ty}^{[m]} l_{ty} \left(1 - f_{ty}\right)^{95}$$

3.3 Leakage

Leakage is estimated as the proportion of degradation observed in the leakage areas in any given monitoring period,

$$E_{L\,\Delta}^{[m]} = E_{L}^{[m]} - E_{L}^{[m-1]}$$

3.3.1 Estimating Emissions from Activity-Shifting Leakage

Emissions from activity-shifting leakage are estimated as

$$LEM(c_P, c_B, p_{L\,DEG}, t, x) = p_{L\,DEG} A_{PAA}(c_P - c_B) - \frac{A_{PAA}(c_P - c_B)}{1 + e^{\ln\left(\frac{1}{p_{L\,DEG}^{[m=0]}} - 1\right) - \beta t + \boldsymbol{\theta}(\boldsymbol{x}_0 - \boldsymbol{x})^T}}$$

3.3.1.1 Delineating the Activity-Shifting Leakage Area

PDR.97 A map of the delineated boundaries.

Refer to Annex A – Map of Project Area.

PDR.98 Maps of the landscape configuration, including:

a. Topography (elevation, slope, aspect);

Refer to Annex C – Map of DEM, Annex D – Map of Slope, and Annex E – Map of Aspect.

b. Recent land use and land cover (either a thematic map created by the project proponent or publically available map);

Refer to Annex B – Map of Land Cover.

c. Access points;

Refer to Annex B – Map of Land Cover.

d. Soil class maps (if available);

e. Locations of important markets;

Refer to Annex B – Map of Land Cover.

f. Locations of important resources like waterways or roads; and

Refer to Annex B – Map of Land Cover.

g. Land ownership/tenure boundaries.

High-quality maps of land ownership do not exist for the leakage area. These lands are predominantly owned and controlled by smallholders.

PDR.99 A narrative describing the rationale for selection of activity-shifting leakage area boundaries.

In order to select the activity-shifting leakage area, forested areas near the project area were examined in two Landsat 7 scenes, one from August 27, 2011 and the other from July 7, 2010. In order to remain conservative, this examination was constrained to areas at least as accessible as the project area to agents of deforestation, if not more so, making any deforestation displaced from the project area more likely to be captured in the leakage area. Indigenous reserves between *Globo 1* and *Globo 2* (the northern and southern portions of the project area) were excluded from the leakage area since the same agents and drivers are not active here. Areas steeper than 33 degrees were also excluded since this constraint was applied to the project accounting area.

In the course of locating plots and collecting data, the sampling teams confirmed that access to the leakage areas is not hindered by lack of access to private property, unusually rugged terrain, or security issues.

PDR.100 Results of a spatial analysis to demonstrate the activity-shifting leakage area is entirely forested as of the project start date.

The activity-shifting leakage area was delineated to exclude all non-forest that was discernible in available Landsat imagery. (Refer to Annex J — Landsat Imagery Demonstrating Presence of Forest in Leakage Area.)

PDR.101 Results of a spatial analysis to demonstrate the activity-shifting leakage area is no larger than the project accounting area.

The activity-shifting leakage area contains 7,152 ha. The project accounting area contains 9,910 ha.

3.3.1.2 The Leakage Emissions Model

3.3.1.3 Estimating $p_{L\,DEG}^{[m]}$

Degradation in the activity-shifting leakage area was assessed by visual estimates in order to determine the proportion of degradation $p_{L\,DEG}^{[m]}$. Sample design was a simple random sample of the activity-shifting leakage area. Plot allocation was performed with the expectation that some plots would not be sampled due to inaccessibility (e.g., steep terrain, safety issues) or time constraints. Sampling teams confirmed the plot locations and that the plots were forested. In two instances, sampling teams encountered non-forest; in these cases, the plots and areas determined to be non-forest were excluded from the activity-shifting leakage area.

Sampling teams made observations in 32 plots and recorded the number of standing trees and stumps according to the visual estimation method for observation degradation. Trees and stumps greater than 12 cm diameter at breast height were observed while walking 15 transects in a zig-zag pattern, thereby observing degradation in an area of 2 ha per plot. The tree and stump observations were summed for all transects in a plot to determine the degradation factor for that plot. The procedures for locating and demarcating the leakage plots and for visually estimating degradation are found in Annex U – Leakage Plot Sampling Protocol.

Plot Number	# Trees Observed	# Stumps Observed	Proportion	Degradation Factor
1	990	2	0.2%	0.2
2	785	18	2.2%	0.2
3	552	5	0.9%	0.2
4	783	0	0.0%	0
5	309	2	0.6%	0.2
6	771	5	0.6%	0.2
7	473	1	0.2%	0.2
8	445	0	0.0%	0
9	517	6	1.1%	0.2
10	763	7	0.9%	0.2
11	1028	4	0.4%	0.2
12	465	6	1.3%	0.2
13	161	0	0.0%	0
14	728	4	0.5%	0.2
15	1149	0	0.0%	0
16	616	1	0.2%	0.2
17	0	0	0.0%	0

Plot Number	# Trees Observed	# Stumps Observed	Proportion	Degradation Factor
18	1241	0	0.0%	0
19	401	0	0.0%	0
20	761	0	0.0%	0
21	777	0	0.0%	0
22	784	0	0.0%	0
23	568	4	0.7%	0.2
24	599	8	1.3%	0.2
25	1117	14	1.2%	0.2
26	570	0	0.0%	0
27	762	5	0.7%	0.2
28	982	20	2.0%	0.2
29	627	4	0.6%	0.2
30	461	7	1.5%	0.2
31	677	6	0.9%	0.2
32	1149	0	0.0%	0
			Proportion of Degradation	**0.125**

Table 16: Observations from leakage plot sampling.

3.3.2 Determining Emissions from Market-Effects Leakage

Emissions from market-effects leakage are quantified using F.47 in VM009.2

$$E_{L\,ME}^{[m]} = p_{L\,ME} E_{B\_AGMT}^{[m]}$$

and table 6 in VM0009.2.

3.3.2.1 Ensuring Constancy of Baseline Operator Management

Not applicable, as this is a U- type baseline.

3.3.2.2 Determining Market-Effects Leakage

Market-effects leakage may be determined by delineating a market-effects leakage area and determining stocks in the area, or using the most conservative discount factor for market leakage of .7. As of the current date, there is no commercial logging in the project area.

3.4 Summary of GHG Emission Reductions and/or Removals

3.4.1 Determining Reversals

The procedure for determining reversals follows the most current version of the VCS requirement.

3.4.1.1 Determining Reversals as a Result of Baseline Reevaluation

In the event there is a reversal due to baseline reevaluation, procedure follows VM009.2, 8.4.2.1, "Determining reversals as a result of baseline revaluation".

3.4.2 Quantifying Net Emissions Reductions for a PAA

NERs are the difference between gross emissions reductions and the buffer allocation, or

$$E_{\Delta\,NER}^{[m]} = E_{\Delta\,GER}^{[m]} - E_{BA}^{[m]}$$

3.4.2.1 Determining Deductions for Uncertainty

Deductions for uncertainty are determined using equation F.53 in VM009.2

$$E_U^{[m]} = E_{\Delta\,GER}^{[m]} \left[\frac{1.64}{E_{B\,\Delta}^{[m]} + A_{PAA} c_P^{[m]} + A_{PX} c_B^{[m]}} \sqrt{\left(U_{EM}^{[M]}\right)^2 + \left(U_P^{[m]}\right)^2 + \left(U_B^{[m]}\right)^2} - 0.15 \right]$$

3.4.2.2 Determining Buffer Account Allocation

Allocation to the buffer pool is determined using the AFOLU tool for non-permanence risk and buffer determination.

3.4.2.2.1 Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination

The project proponent has assessed the non-permanence risks that are applicable to this project, and judged the overall risks to the permanence of the project's benefits to be moderate. In most cases, these risks are mitigated to some extent either by the project proponent's management actions or by project activities. The assessment was conducted as prescribed in the VCS AFOLU Non-Permanence Risk Tool, version 3.2.

Internal Risk	Level of Risk or Mitigation	Justification	Score
Project management	Ongoing enforcement to prevent encroachment by outside actors is required to protect more than 50 of stocks on which GHG credits have been previously been issued.	Agents of deforestation are expected to be active in the vicinity of the project area for the duration of the project crediting period.	2
	Management team includes individuals with significant experience in AFOLU project design and implementation, carbon accounting and reporting (eg, individuals who have successfully managed projects through validation, verification and issuance of GHG credits) under the VCS Program or other approved GHG programs.	Management team engaged technical consultant ecoPartners to lead AFOLU project design and implementation and carbon accounting and reporting. ecoPartners has successfully managed projects through validation, verification and issuance of GHG credits.	-2
	Adaptive management plan in place.	Adaptive management plan in place.	-2
		Subtotal – Project Management	-2

Internal Risk	Level of Risk or Mitigation	Justification	Score
Financial viability	Project cash flow breakeven point between 4 and up to 7 years from the current risk assessment	Project cash flow breakeven point is between 4 and up to 7 years from the current risk assessment.	1
	Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches break even	Project has secured 15% to less than 40% of funding needed to cover the total cash out required before the project reaches break even	2
		Subtotal – Financial Viability	3
Opportunity cost	NPV from the most profitable alternative land use activity is expected to be between 20% more than and up to 20% less than from project activities	Most profitable alternative land use activity (cattle ranching) is expected to be comparable with project activities, given the variability of both cattle prices and GHG credits.	0
	Project is protected by legally binding commitment to continue management practices that protect the credited carbon stocks over the length of the project crediting period	Project is protected by legally binding commitment to continue management practices over the length of the project crediting period	-2
		Subtotal – Opportunity Cost	0
Project longevity	With legal agreement or requirement to continue the management practice	Legal agreements are in place to continue the management practice.	15
Total – Internal Risks			14

Table 17: Internal non-permanence risks.

External Risk	Level of Risk or Mitigation	Justification	Score
Land and Resource Tenure	Ownership and resource access/use rights are held by same entity(s)	Ownership and resource access/use rights are held by Cocomasur communities.	0
	There exist disputes over access/use rights (or overlapping rights)	There exist limited occurrences of land disputes in the project area.	5
	Where disputes over land tenure, ownership or access/use rights exist,	Project has implemented activities to resolve land disputes and overlapping	-2

External Risk	Level of Risk or Mitigation	Justification	Score
	documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims	claims.	
		Subtotal – Land and Resource Tenure	3
Community Engagement	Where disputes over land tenure, ownership or access/use rights exist, documented evidence is provided that projects have implemented activities to resolve the disputes or clarify overlapping claims	The project earned Gold Level CCB Standard validation.	-5
		Subtotal – Community Engagement	-5
Political Risk	Governance score of -0.79 to less than -0.32	Colombia's WGI score (as prescribed in Risk Tool) is -0.39.	4
	Country is implementing REDD+ Readiness or other activities	Colombia is implementing REDD+ Readiness activities.	-2
		Subtotal – Political Risk	2
Total – External Risks			0

Table 18: External non-permanence risks.

Natural Risks

- Fire: Although large fires are common in some areas of Colombia (e.g., Orinoco region of eastern Colombia), the Chocó-Darién is a wet tropical ecosystem and the risk of reversals from fire is deemed to be very low. Furthermore, project activities which maintain or reduce the prevalence of human activities (e.g., forest monitoring and enforcement to deter slash-and-burn land clearing) will ensure that human-caused fire risk will remain low.
  (Source: http://www.oecoamazonia.com/en/news/colombia/368-fogo-ameaca-florestas-na-colombia)
- Insect pests: The risk of insect pest infestation affecting carbon stocks is very low. Only 1.2% of Colombia's forest plantations have suffered severe defoliating outbreaks, and overall mortality is only 0.48% of plantation area in these cases. Furthermore, growth and recovery after these attacks is about 60%. (Source: Madrigal 1993 (http://www.fao.org/docrep/012/ak986e/ak986e00.pdf).
- Extreme weather: The risk of extreme weather affecting carbon stocks is deemed to be low. The most significant risk affecting carbon stocks are landslides caused by flooding, and risk of landslides near the project area is high (Fell et al. 2005). However, hazard assessment revealed that most of these

landslides were triggered by human activities related to highway construction, deforestation and population settlements (Montero 2003 in Fell et al. 2005). To the extent that the project area is a remote, rugged region unlikely to attract major road construction projects, and such projects will not be allowed under the implementation of this REDD project, carbon stocks are thus at low risk.

- Geologic events: The risk of geologic events affecting carbon stocks is deemed to be very low. There is no volcanic activity near the project area. One major earthquake (magnitude 7.3) has occurred near the Panama-Colombia border since 1974, and although there is a continuing risk of earthquakes near Chocó-Darién, such an event poses no risk to carbon stocks.
  (Sources: http://earthquake.usgs.gov/earthquakes/world/historical_country.php#colombia, http://earthquake.usgs.gov/earthquakes/world/colombia/gshap.php.)

Natural risk	Significance	Likelihood	Likelihood-Significance Score	Mitigation	Score
Fire	Major (up to 50% loss)	Not applicable	0	1	0
Insect pests	Insignificant (less than 5% loss)	Less than once every 50 years	0	1	0
Extreme weather	Insignificant (less than 5% loss)	Less than once every 50 years	0	1	0
Geologic events	No loss	Not applicable	0	1	0
Subtotal					0

Table 19: Natural non-permanence risks.

Total Non-Permanence Risk

Risk Category	Score
Internal Risks	16
External Risks	0
Natural Risks	0
Total Score	16
Overall Risk Rating	**16%**

Table 20: Total non-permanence risks.

3.4.3 Quantifying Net Emissions Reductions across PAAs

This project contains only one project accounting area.

3.4.4 *Ex-Ante* Estimation of NERs

In the case when ex-ante estimates are used to prove the significance of emissions sources or estimate the quantity of NERs over the project crediting period, the project description shall include the following:

PDR.110 The projected avoided baseline emissions, project emissions and leakage for each monitoring period over the lifetime of the project.

Monitoring Period	Date of Monitoring	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
1	08/15/2012	124497	0	0	104,577.00
2	08/15/2013	76193	0	0	64,002.00
3	08/15/2014	77408	0	0	65,022.00
4	08/15/2015	84377	0	0	70,876.00
5	08/15/2016	91888	0	0	80,820.00
6	08/15/2017	91897	0	0	77,193.00
7	08/15/2018	107244	0	0	90,084.00
8	08/15/2019	98533	0	0	82,767.00
9	08/15/2020	114582	0	0	96,248.00
10	08/15/2021	113003	0	0	102,759.00
11	08/15/2022	116429	0	0	97,800.00
12	08/15/2023	122690	0	0	103,059.00
13	08/15/2024	116907	0	0	98,201.00
14	08/15/2025	133754	0	0	112,353.00

Monitoring Period	Date of Monitoring	Estimated baseline emissions or removals (tCO2e)	Estimated project emissions or removals (tCO2e)	Estimated leakage emissions (tCO2e)	Estimated net GHG emission reductions or removals (tCO2e)
15	08/15/2026	127271	0	0	119,680.00
16	08/15/2027	130291	0	-2,230	107,213.00
17	08/15/2028	113582	0	-9,891	85,517.00
18	08/15/2029	124331	0	-18,291	86,146.00
19	08/15/2030	120387	0	-12,357	88,767.00
20	08/15/2031	115038	0	-22,149	92,084.00
21	08/15/2032	120520	0	-21,728	79,507.00
22	08/15/2033	126100	0	-21,084	84,839.00
23	08/15/2034	105911	0	-26,984	61,981.00
24	08/15/2035	130148	0	-26,656	82,668.00
25	08/15/2036	115282	0	-26,093	93,130.00
26	08/15/2037	111429	0	-33,407	60,192.00
27	08/15/2038	115667	0	-33,293	63,867.00
28	08/15/2039	111181	0	-42,088	51,303.00
29	10/17/2040	165862	0	-32,914	106,410.00
	Total	3,302402	0	-329,166	2,509,065.00

Table 21: Estimated net GHG emission reductions or removals during the project crediting period.

PDR.111 A narrative description of sources used to estimate the leakage rate and demonstration that the estimated rate is conservative.

The leakage rate is estimated using expert knowledge from COMASUR, and by comparing it to rates in comparable REDD projects. A leakage rate of 5% of baseline emissions was used.

PDR.112 If included in project activities, a description of procedures used to estimate the rate of biomass burning and charcoal production and demonstration that these estimates are conservative.

Not applicable. Biomass burning and charcoal production are not included in project activities.

3.4.5 Evaluating Project Performance

The project proponent plans to evaluate project performance, including any deviations from *ex-ante* NERs, at each monitoring event (*i.e.*, annually). Sources of deviation may include changes in the quality of data (e.g., literature estimates vs. carbon stock estimates), disturbance events in the project area, or baseline re-evaluation. At each monitoring period, the project proponent will compare NERs presented for verification relative to NERs from *ex-ante* estimates and will document the causes of deviation.

4 Monitoring

4.1 Data and Parameters Available at Validation

PDR.113 The value for each variable in Appendix G.

Refer to Annex W – Data and Parameters Available at Validation.

4.2 Data and Parameters Monitored

Refer to Annex X – Data and Parameters Monitored.

4.3 Description of the Monitoring Plan

A public version of the monitoring plan has been provided as Annex Y – Monitoring Plan. The objective of the monitoring plan is to achieve accurate, regular estimates of carbon stocks and emissions reductions by the project. All plots will be re-measured at least once every five years. The monitoring plan includes four continual monitoring activities:

Activity	Frequency	Method
Forest Patrols and Perimeter Observation	Twice per year	Patrol team inspects perimeter of project area
Plot Measurements	Once per year	Sampling teams visit a portion of plots in project, proxy, and leakage areas
Identification of Significant Disturbance	Once every 2-3 years or after major disturbance event	Periodic inspection of aerial imagery or videography, with ground inspection when necessary
Recordation of Log Production	When biomass harvest occurs in the project area	Data recordation and reporting at time of verification

Table 22: Monitoring activities.

Descriptions and frequencies of these monitoring activities are described in Annex Y. The monitoring plan also maintains the organizational structure of the people responsible for the implementation of the monitoring plan. Finally, the monitoring plan includes training and internal audit procedures for quality control and assurance.

PDR.114 Summary of sampling procedures for the project accounting areas, with a copy of a sampling protocol used to carry out measurements.

The project proponent's sampling procedures are described in detail in Annex V – Forest Measurement Protocol, which was written to ensure that plot measurements are performed and recorded accurately. This annex includes detailed information regarding sample design, plot layout and measurement, reporting and quality assurance procedures.

PDR.115 Summary of sampling procedures for the proxy areas, with a copy of a sampling protocol used to carry out measurements.

Monitoring activities in the proxy area employ the same sampling procedures as employed in the project accounting area. Refer to Annex V – Forest Measurement Protocol.

PDR.116 Summary of sampling procedures for the activity-shifting leakage areas, with a copy of a sampling protocol used to carry out measurements.

The project proponent established sampling plots by random allocation in the leakage area. To estimate degradation in each plot, field crews tally the number of standing trees and stumps observed while walking a designated path through the plot. Refer to Annex U – Leakage Plot Sampling Protocol.

5 Environmental Impact

An environmental impact assessment was not conducted for several reasons. First, the project avoids deforestation and project activities are not expected to cause any adverse environmental impacts. Second, the leakage mitigation measures (described in section 1.13.1) are expected to adequately mitigate off-site environmental impacts in the vicinity of the project. Finally, the project earned Gold Level Climate, Community & Biodiversity (CCB) validation, thereby affirming the project's significant benefits for biodiversity as well as the community members who rely upon the project area for their livelihoods.

6 Stakeholder Comments

Stakeholder comments were solicited via the Climate Community and Biodiversity Alliance. This project can be found at http://www.climate-standards.org/projects/index.html. No comments were submitted.

7 References

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