THE CHOCÓ-DARIÉN CONSERVATION CORRIDOR REDD PROJECT

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

MR	Requirement	Applicability
MR.1	A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.	Applicable
MR.2	The project start date.	Applicable
MR.3	The *project crediting period start date*, end date and length.	Applicable
MR.4	A list and descriptions of all instances in the group.	Not applicable. Not a group project.
MR.5	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 group project.
MR.6	A digital (GIS-based) map of the accounting areas with at least the above minimum requirements for delineation of the geographic boundaries.	Applicable
MR.7	For each project activity instance in the group, its project activity instance start date.	Not applicable. Not a grouped project.
MR.8	For each project accounting area, the value of	Not applicable. Not a grouped project.
MR.9	A table of covariate values as of the project activity instance start dates and a description of how the values were determined including any interpolation or extrapolation methods.	Not applicable. Not a grouped project.
MR.10	Calculations of current baseline emissions $E_{B\Delta}^{[m]}$ as of the current	Applicable

MR	Requirement	Applicability
	monitoring period.	
MR.11	Calculations of baseline emissions $E_{B\,\Delta}^{[m-1]}$ from prior monitoring periods.	Not applicable. First monitoring period.
MR.12	Calculations of cumulative baseline emissions for each selected pool ($E_{B\,BM}^{[m]}$ and $E_{B\,SOC}^{[m]}$) and undecayed carbon ($C_{B\,BGB}^{[m]}$, $C_{B\,DW}^{[m]}$, $C_{B\,SOC}^{[m]}$ and $C_{B\,WP}^{[m]}$), as of the current monitoring period.	Applicable
MR.13	Calculations of cumulative baseline emissions from biomass $E_{B\,BM}^{[m]}$ for the current monitoring period.	Applicable
MR.14	Calculations of cumulative baseline emissions from biomass $E_{B\,BM}^{[m]}$ for all prior monitoring periods.	Not applicable. First monitoring period.
MR.15	The order of strata from lowest carbon stocks to highest carbon stocks based on the average across all pools.	Not applicable. Not Type U3.
MR.16	Calculations for each step which are carried through from monitoring period to monitoring period.	Not applicable. Not Type U3.
MR.17	Calculations of cumulative baseline emissions from biomass $E_{B\,BM}^{[m]}$ for prior monitoring periods.	Not applicable. Not Type U3.
MR.18	An estimate of current baseline emissions from biomass $E_{B\,\Delta\,SOC}^{[m]}$ as of the current monitoring period.	Not applicable. Not Type P1 or P2.
MR.19	An estimate of cumulative baseline emissions from biomass $E_{B\,SOC}^{[m]}$ for the current monitoring period.	Not applicable. Not Type P1 or P2.
MR.20	Calculations of cumulative baseline emissions from biomass $E_{B\,SOC}^{[m]}$ for all prior monitoring periods.	Not applicable. Not Type P1 or P2.
MR.21	An estimate of current baseline emissions from biomass $E_{B\,\Delta\,SOC}^{[m]}$ as of the current monitoring period.	Not applicable. Not Type U1.
MR.22	An estimate of cumulative baseline emissions from biomass $E_{B\,SOC}^{[m]}$ for the current monitoring period.	Not applicable. Not Type U1.
MR.23	Calculations of cumulative baseline emissions from biomass $E_{B\,SOC}^{[m]}$ for all prior monitoring periods.	Not applicable. Not Type U1.
MR.24	An estimate of current baseline emissions from biomass $E_{B\,\Delta\,SOC}^{[m]}$ as of the current monitoring period.	Applicable
MR.25	An estimate of cumulative baseline emissions from biomass $E_{B\,SOC}^{[m]}$ for the current monitoring period.	Applicable
MR.26	Calculations of cumulative baseline emissions from biomass $E_{B\,SOC}^{[m]}$ for all prior monitoring periods.	Not applicable. First monitoring period.
MR.27	An estimate of carbon stored in non-decayed DW $C_{B\,\Delta DW}^{[m]}$ for the	Not applicable. Not a selected carbon pool.

MR	Requirement	Applicability
	current monitoring period.	
MR.28	An estimate of cumulative baseline emissions from DW $E_{B\ DW}^{[m]}$ for the current monitoring period.	Not applicable. Not a selected carbon pool.
MR.29	An estimate of cumulative baseline emissions from AGMT $E_{B\ AGMT}^{[m]}$ for the current monitoring period.	Not applicable, de minimus in the baseline and combined with AGOT.
MR.30	Calculations of cumulative baseline emissions from DW $E_{B\ DW}^{[m]}$ for all prior monitoring periods.	Not applicable. Not a selected carbon pool.
MR.31	Calculations of cumulative baseline emissions from AGMT $E_{B\ AGMT}^{[m]}$ for all prior monitoring periods.	Not applicable. Not a selected carbon pool.
MR.32	An estimate of carbon stored in non-decayed BGB $C_{B\ \Delta\ BGB}^{[m]}$ for the current monitoring period.	Applicable
MR.33	An estimate of cumulative baseline emissions from BGB $E_{B\ BGB}^{[m]}$ for the current monitoring period.	Applicable
MR.34	Calculations of cumulative baseline emissions from BGB $E_{B\ BGB}^{[m]}$ for all prior monitoring periods.	Not applicable. First monitoring period.
MR.35	An estimate of carbon stored in non-decayed SOC $C_{B\ \Delta SOC}^{[m]}$ for the current monitoring period.	Applicable
MR.36	Carbon stored in long-lived wood products $C_{B\ \Delta\ WP}^{[m]}$ after 100 years.	Not applicable, *de minimus* in the baseline
MR.37	Calculations to determine $C_{B\ \Delta\ WP}^{[m]}$.	Not applicable, *de minimus* in the baseline.
MR.38	A map of the boundaries of any significant disturbance in the project accounting areas during the monitoring period.	Not applicable. No emissions events during the monitoring period.
MR.39	Evidence that plots were installed into these disturbed areas and were measured per section 9.	Not applicable. No emissions events during the monitoring period.
MR.40	A table of events when woody biomass was burned during the monitoring period, showing the weight of woody biomass in tonnes and the date consumed.	Not applicable. No biomass burning from project activities.
MR.41	Carbon stored in long-lived wood products $C_{P\ \Delta\ WP}^{[m]}$ after 100 years.	Not applicable, *de minimus* in the baseline.
MR.42	Scale reports or records to of carbon in long-lived wood products by wood product type $C_{P\ ty}^{[m]}$.	Not applicable, *de minimus* in the baseline.
MR.43	Calculations to determine $C_{P\ \Delta\ WP}^{[m]}$.	Not applicable, *de minimus* in the baseline.
MR.44	A description of project activities that have been implemented since the project start date and the estimated effects of these activities on	Applicable

MR	Requirement	Applicability
	leakage mitigation.	
MR.45	Calculated cumulative baseline emissions from activity-shifting leakage for the current monitoring period $E_{L\,AS}^{[m]}$ and supporting calculations.	Applicable
MR.46	Calculated cumulative baseline emissions from activity-shifting leakage for the prior monitoring periods $E_{L\,AS}^{[m]}$.	Not applicable. First monitoring period.
MR.47	A description and justification of the change to the activity-shifting leakage area.	Not applicable. First monitoring period.
MR.48	A map of the delineated boundaries.	Not applicable. First monitoring period.
MR.49	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. First monitoring period.
MR.50	A narrative describing the rationale for selection of activity-shifting leakage area boundaries. If the activity-shifting leakage area is smaller than the project accounting area or cannot be defined, justification for the size of the area.	Not applicable. First monitoring period.
MR.51	Results of a spatial analysis to demonstrate the activity-shifting leakage area is entirely forested as of the project start date.	Not applicable. First monitoring period.
MR.52	Results of a spatial analysis to demonstrate the activity-shifting leakage area is as large or larger than the project accounting area.	Not applicable. First monitoring period.
MR.53	A map of the delineated boundaries.	Not applicable. First monitoring period.
MR.54	The estimated value $\hat{p}_{L\,DEG}^{[m]}$ for the current monitoring period and supporting calculations.	Applicable
MR.55	The calculated value $\hat{p}_{L\,DEG}^{[m=0]}$ calculated for the first monitoring period.	Applicable
MR.56	Estimated cumulative baseline emissions from market-effects leakage for the current monitoring period $E_{L\,ME}^{[m]}$ and supporting calculations.	Not applicable. No market-effects leakage.
MR.57	Calculated cumulative baseline emissions from market-effects leakage for the prior monitoring periods $E_{L\,ME}^{[m]}$.	Not applicable. No market-effects leakage.
MR.58	Provide evidence in the form of GIS imagery, PRA evidence, or the baseline operator's management plan that management plans or land-use designations have not changed in the baseline operator's other lands.	Not applicable. Not Type P1 or P2.
MR.59	Quantified GERs for the current monitoring period including references to calculations.	Applicable
MR.60	Quantified GERs for the prior monitoring period.	Not applicable. First monitoring period.
MR.61	A graph of GERs by monitoring period for all monitoring periods to date	Applicable

MR	Requirement	Applicability
MR.62	The confidence deduction $E_U^{[m]}$ and estimated standard errors used to determine the confidence deduction.	Applicable
MR.63	Reference to calculations used to determine the confidence deduction.	Applicable
MR.64	The linear model used to generate GERs for the current monitoring period.	Not applicable. Linear model not used.
MR.65	A graph of GERs from the linear model by monitoring period for all monitoring periods to date that used a linear model.	Not applicable. Linear model not used.
MR.66	A description of the reversal including which pools contributed to the reversal and reasons for its occurrence.	Not applicable. No reversals in this monitoring period.
MR.67	A description of the reversal including a summary of new data obtained in the reference area.	Not applicable. No reversals in this monitoring period.
MR.68	Quantified NERs for the current monitoring period including references to calculations.	Applicable
MR.69	Quantified NERs for the prior monitoring period.	Not applicable. First monitoring period.
MR.70	A graph of NERs by monitoring period for all monitoring periods to date.	Applicable
MR.71	Reference to the VCS requirements used to determine the buffer account allocation.	Applicable
MR.72	Reference to calculations used to determine the buffer account allocation.	Applicable
MR.73	Quantified NERs for the current monitoring period including references to calculations.	Not applicable. Only one accounting area.
MR.74	Quantified NERs for the prior monitoring period.	Not applicable. Only one accounting area.
MR.75	A graph of NERs by monitoring period for all monitoring periods to date.	Not applicable. Only one accounting area.
MR.76	Quantified NERs by vintage year for the current monitoring period including references to calculations.	Applicable.
MR.77	Comparison of NERs presented for verification relative to NERs from *ex-ante* estimates.	Not applicable. No ex ante estimates for first monitoring period.
MR.78	Description of the cause and effect of deviations from *ex-ante* estimates.	Not applicable. No ex ante estimates for first monitoring period.
MR.79	List of parameters from Appendix H, their values and the time last measured.	Applicable
MR.80	Quality assurance and quality control measures employed for each.	Applicable
MR.81	Description of the accuracy of each.	Applicable
MR.82	Documentation of training for field crews.	Applicable
MR.83	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.

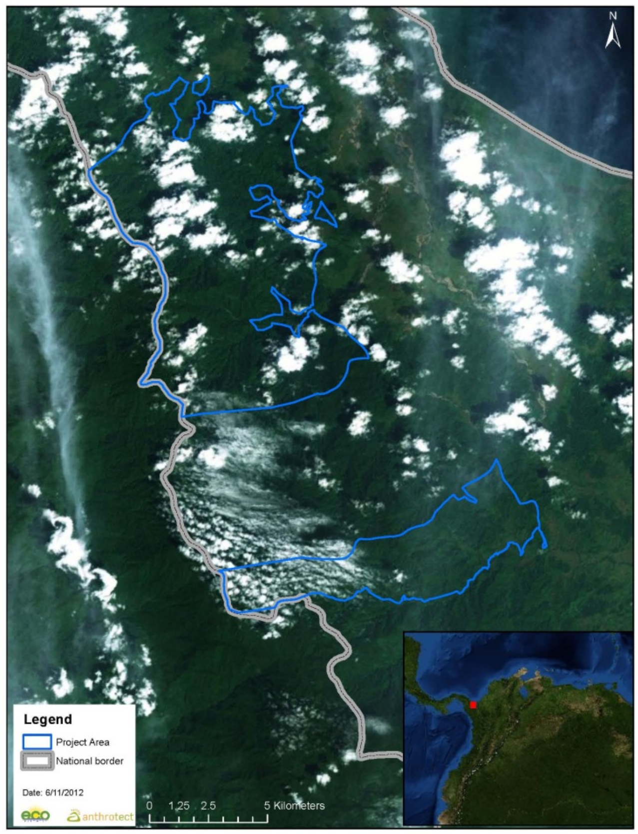
MR	Requirement	Applicability
MR.84	Documentation of data quality assessment such as a check cruise and plots of the data such as diameter distributions by strata or plot.	Applicable
MR.85	Maps of a stratification (if any) and references to plot allocation.	Not applicable. No stratification.
MR.86	List of plot GPS coordinates.	Applicable
MR.87	Description of plot size and layout (such as the use of nests and their sizes) for each carbon pool.	Applicable
MR.88	If applicable, a detailed description of the process used to develop allometric equations, to include: a) Sample size b) Distribution (e.g. diameter) of the sample c) Model fitting procedure d) Model selection	Applicable
MR.89	The estimated carbon stock, standard error of the total for each stock, and the sample size for each stratum in the area selected.	Applicable
MR.90	Log export monitoring records and standard operating procedure in the project area, if there is commercial harvest in the project scenario.	Not applicable. No commercial harvest in the project scenario.
MR.91	Deviations from the measurement methods set out in Appendix B or the monitoring plan, per current VCS requirement.	Applicable
MR.92	The frequency of monitoring for each plot for all plots – all plots should be measured for the first verification. All leakage plots should be measured every verification, and all proxy and project accounting area plots at least every 5-10 years, or after a significant event that changes stocks.	Applicable
MR.93	A list of all selected allometric equations used to estimate biomass for trees and non-trees.	Applicable
MR.94	For each selected allometric equation, a list of species to which it being applied and the proportion of the total carbon stocks predicted by the equation.	Applicable
MR.95	For each selected allometric equation, indication of when it was first employed to estimate carbon stocks in the project area (monitoring period number and year of monitoring event).	Applicable
MR.96	For each selected allometric equation, indication of whether was validated per methodology sections 9.3.1.1 or 9.3.1.2.	Applicable
MR.97	Documentation of the source of each selected allometric equation and justification for their applicability to the project area considering climatic, edaphic, geographical and taxonomic similarities between the project location and the location in which the equation was derived.	Applicable
MR.98	A list of allometric equations validated by destructive sampling.	Applicable
MR.99	For each, the number of trees (or non-trees) destructively sampled and the location where the measurement were made relative to the project area.	Applicable
MR.100	A field protocol used to measure destructively sampled trees (or non-trees).	Applicable
MR.101	Justification that the field protocol for the destructive measurement method is conservatively estimates biomass.	Applicable

MR	Requirement	Applicability
MR.102	For each allometric equation in the list, a figure showing all the descriptive measurements of biomass compared to predicted values from its selected allometric equation.	Applicable
MR.103	A list of allometric equations cross validated.	Applicable
MR.104	For each, the number of trees (or non-trees) destructively sampled to build the equation and the location where the measurement were made relative to the project area.	Applicable
MR.105	A field protocol used to measure trees (or non-trees) when developing the equation.	Applicable
MR.106	Justification that the field protocol for the measurement method to build the equation conservatively estimates biomass.	Applicable
MR.107	For each allometric equation in the list, the value of $\overline{E}$.	Applicable

1 PROJECT DETAILS

1.1 Summary Description of 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.



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 Acandi. 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 unplanned deforestation) by the definition provided in the VM0009 methodology (version 2).

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. Anthrotect has a longstanding relationship with the communities of *Cocomasur*. *Cocomasur* signed a formal agreement to collaborate with Anthrotect on this project in October 2010.

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Calle 7D #43C-23
Medellín, Colombia
Tel +57 (4) 266-1250
http://www.anthrotect.com

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 this project in the capacities indicated:

Organization	Capacity	Contact	Addresses
Cocomasur	Implementing Organization	Ms. Everildys Córdoba Project Coordinator	Barrio Julio Córdoba Acandi, 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 Profession, 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

1.5 Project Start Date

MR.2 The project start date.

The project start date is October 18, 2010.

1.6 Project Crediting Period

MR.3 The project crediting period start date, end date and length.

The project crediting period begins at the project start date October 18, 2010 and continues until October 17, 2040. The project crediting period is 30 years.

1.7 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 Acandi. The project is approximately 250km northwest of Bogota and 10km southwest of the town of Acandi, and is adjacent to the Colombia-Panama border.

MR.1 A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.

See Annex A – Map of Project Area.

MR.6 A digital (GIS-based) map of the project area with at least the above minimum requirements for delineation of the geographic boundaries.

See Annex A – Map of Project Area.

1.8 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 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

Project activities are described in section 1.8 (Description of the Project Activity) of the Project Document. The project activities are designed to mitigate deforestation by developing economic alternatives for local communities, in addition to ensuring that the monetary and other benefits of this project are realized largely by local communities.

Project Activity	Start Date	Status	Details
Governance			
Community territory awareness and land dispute resolution	September 2009	Implementation	Legal documentation completed that enables Council to operate under the national legal framework. Statutes and rules of procedure updated. Nine land conflicts identified for intervention to ensure peaceful resolution. Workshop conducted on Law 70 (collective rights). Community survey developed to monitor community awareness of community rights and benefits.
Governance education and communication	October 2010	Implementation	Cocomasur completed assessment and reorganization of Local Councils to comply with organizational statutes. Focal areas for project activities were identified. Protocols for communication among Local Councils were established.
Internal transparency and accountability	January 2012	Design	Regular monitoring of implementation activities and expenses by the Fund for Environmental Action. Annual financial review completed by independent auditor.
Enforcement and Management			
Territorial demarcation	August 2010	Implementation	Field observations to improve demarcation of territorial boundaries by corroborating community boundaries with coordinates provided by the Colombian government. Field trips were conducted in August 2010, October 2010, November 2010, February 2011, April 2011, May 2011, and June 2011.
Forest patrols	August 2010	Design	Patrols performed in conjunction with territorial demarcation field trips. Initial patrols occurred in August 2010, October 2010, November 2010, February 2011, April 2011, May 2011, and June 2011. Formal training to take place in July 2012.
Monitoring of forest carbon stocks	October 2011	Implementation	Training conducted December 2011 – April 2012 for ongoing monitoring for duration of project crediting period. Field measurements completed March 2012 – May 2012 for first monitoring period.
Administrative and financial best practices	April 2012	Implementation	Fondo Accion ICAF assessment completed and areas for administration and finance training identified. Cocomasur capacity demonstrated in financial management and bookkeeping. Cocomasur bank account activated.

Project Activity	Start Date	Status	Details
			Budgets submitted and reconciled on time. General planning meetings held quarterly.
Economic Alternatives and Incentives			
Access to health and educational resources	July 2011	Implementation	Community census completed to track basic information on health and education.

The forest patrols shall be carried out according to the protocols and requirements prescribed in Annex H – 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.

Leakage is monitored according to the method described in section 3.3.1 (Estimating Emissions from Activity-Shifting Leakage) of the Project Document and in Annex C – Leakage Plot Sampling Protocol. Several project activities – including efforts to improve agricultural and silvopastoral practices, develop sustainable timber harvest plans, and secure access to credit and markets for non-timber goods and services – are intended to manage and/or mitigate leakage resulting from the project. Furthermore, many project activities are intended at least in part to provide jobs for local community members, thereby reducing pressure on forests throughout the region.

Several project activities were also designed to manage and/or mitigate the internal, external and natural non-permanence risks described in section 3.4.2 (Determining Reversals) of the Project Document. Nearly all project activities address the long-term financial sustainability of the project, thereby reducing internal risks related to financial viability and project longevity. External risks are addressed by efforts to design effective and inclusive mechanisms for territorial governance, build awareness of the local communities' territorial rights and of the benefits of this project, and achieve greater health and well-being for local communities. The non-permanence risk analysis determined that the project proponent has mitigated most internal and external risks, including project management, opportunity cost, project longevity, land and resource tenure, community engagement, and political risk. Furthermore, natural risks to permanence were judged to be low.

2.2 Project Description Deviations

MR.91 Deviations from the measurement methods set out in Appendix B or the monitoring plan, or current VCS requirement.

No deviations from the monitoring plan have occurred. Refer to Section 2.6 of the Project Document for deviations from the methodology at the time of validation.

2.3 Grouped Project

This project is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

MR.79 List of parameters from Appendix H, their values and the time last measured.

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

MR.80 Quality assurance and quality control measures employed for each.

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

MR.81 Description of the accuracy of each.

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

3.2 Description of the Monitoring Plan

The objective of the monitoring plan is to achieve accurate, regular estimates of carbon stocks and emissions reductions by the project. 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

Descriptions and frequencies of these monitoring activities are described in Annex H – Monitoring Plan. 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.

MR.82 Documentation of training for field crews.

Refer to Annex H – Monitoring Plan.

MR.84 Documentation of data quality assessment such as a check cruise and plots of the data such as diameter distributions by strata or plot.

Refer to Annex H – Monitoring Plan.

MR.86 List of plot GPS coordinates.

Refer to Annex K – Plot List. For a map of plot locations, refer to Annex Q – Map of Plot Locations.

MR.87 Description of plot size and layout (such as the use of nests and their sizes) for each carbon pool.

Refer to Annex H – Monitoring Plan.

MR.89 The estimated carbon stock, standard error of the total for each stock, and the sample size for each stratum in the area selected.

Refer to Annex H – Monitoring Plan and Annex J – Inventory.

MR.92 The frequency of monitoring each plot for all plots – all plots should be measured for the first verification, and all proxy and project accounting area plots at least every 5-10 years, or after a significant event that changes stocks.

All plots were measured in the first monitoring period. Refer to Annex H – Monitoring Plan for the schedule of re-measurement of plots. For a map of plot locations, refer to Annex Q – Map of Plot Locations.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions were determined by means of a logistical cumulative deforestation model, based upon historical deforestation observed in the reference area.

Component	First Monitoring Period (m_1)	Total
Gross NERs	124,497 tCO_2e	124,497 tCO_2e
16% buffer tonnes to VCS	19,920	19,920
Net NERs	104,577	104,577

Refer to Annex P – Proxy Inventory for carbon stock estimates in the baseline scenario.

MR.10 Calculation of current baseline emissions $E_{B\Delta}^{[m]}$ as of the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.12 Calculations of cumulative baseline emissions for each selected pool ($E^{[m]}_{B\,\Delta\,BM}$ and $E^{[m]}_{B\,\Delta\,SOC}$) and undecayed carbon $C^{[m]}_{B\,\Delta\,BGB}$, $C^{[m]}_{B\,\Delta\,DW}$, $C^{[m]}_{B\,\Delta\,SOC}$ and $C^{[m]}_{B\,\Delta\,WP}$), as of the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.13 Calculations of cumulative baseline emissions from biomass $E^{[m]}_{B\,BM}$ for the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.24 An estimate of current baseline emissions from biomass $E^{[m]}_{B\,\Delta\,SOC}$ as of the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.25 An estimate of cumulative baseline emissions from biomass $E^{[m]}_{B\,SOC}$ for the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.31 An estimate of cumulative baseline emissions from AGMT $E^{[m]}_{B\,AGMT}$ for the current monitoring period.

Not applicable. This pool has been combined with AGOT in the baseline because wood products are *de minimus.*

MR.32 An estimate of carbon stored in non-decayed BGB $C^{[m]}_{B\,\Delta\,BGB}$ for the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.33 An estimate of cumulative baseline emissions from BGB $E^{[m]}_{B\,BGB}$ for the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.35 An estimate of carbon stored in non-decayed SOC $C^{[m]}_{B\,\Delta SOC}$ for the current monitoring period.

Refer to Annex H – NER Worksheet and Annex G – Data and Parameters Monitored.

MR.36 Carbon stored in long-lived wood products $C^{[m]}_{B\,\Delta\,WP}$ after 100 years.

Not applicable because wood products in the baseline scenario are *de minimus.*

MR.37 Calculations to determine $C^{[m]}_{B\,\Delta\,WP}$.

Not applicable because wood products in the baseline scenario are *de minimus.*

4.2 Project Emissions

Project emissions during this monitoring period were zero. There were no disturbance events (e.g., fire, logging, burning) in the project area. The project proponent made this determination after having regular observed the project area in the course of conducting the forest inventory and implementing forest patrols.

4.3 Leakage

Leakage emissions are determined by first observing degradation and deforestation in the leakage area, and then subsequently determining the cumulative extent of degradation and deforestation that occurs over time. The method and associated protocols for estimating leakage emissions have been established for this project; randomly selected plots were observed for evidence of degradation and deforestation and will be re-measured in future monitoring periods. (Refer to Annex C – Leakage Plot Sampling Protocol.)

MR.44 A description of project activities that have been implemented since the project start date and the estimated effects of these activities on leakage mitigation.

Project activities that are intended to mitigate leakage are described in section 1.13.1 (Leakage Management) of the Project Document.

Project Activity	Start Date	Status	Details
Access to health and educational resources	July 2011	Implementation	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. Community census completed to track basic information on health and education.
Education and awareness of ecosystem service values	October 2012	Design	Community members will participate in and learn about new knowledge and experience gained through biodiversity inventory and other monitoring.
Improved agricultural and silvopastoral practices	July 2013	Design	Community members will receive information and training on state of the art techniques to improve land productivity.
Sustainable timber harvesting	January 2013	Design	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*.

Project Activity	Start Date	Status	Details
Reforestation	January 2013	Design	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.
Access to credit and markets for non-timber goods and services	July 2013	Design	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.

MR.45 Calculated cumulative emissions from activity-shifting leakage for the current monitoring period $E_{L\,AS}^{[m]}$ and supporting calculations.

For the first monitoring period (m_1), leakage emissions are zero, as prescribed by the methodology.

MR.54 The estimated value $\hat{p}_{L\,DEG}^{[m]}$ for the current monitoring period and supporting calculations.

Refer to Annex L – Leakage Worksheet and Annex G – Data and Parameters Monitored.

MR.55 The calculated value $\hat{p}_{L\,DEG}^{[m]}$ for the first monitoring period.

Refer to Annex L – Leakage Worksheet and Annex G – Data and Parameters Monitored.

4.4 Summary of GHG Emission Reductions and Removals

Component	Value (tonnes CO_2e)
Estimated Baseline Emissions, m_1	124,497
Uncertainty Deduction	0
Project Emissions, m_1	0
Leakage Emissions, m_1	0
Gross NERs, m_1	124,497
NERs to VCS Buffer Pool (16%)	19,920
Net NERs, m_1	104,577

MR.59 Quantified GERs for the current monitoring period including references to calculations.

Refer to Annex I – NER Worksheet.

MR.61 A graph of GERs by monitoring period for all monitoring periods to date.

Refer to Annex I – NER Worksheet.

MR.62 The confidence deduction $E_U^{[m]}$ and estimated standard errors used to determine the confidence deduction.

Refer to Annex I – NER Worksheet.

MR.63 Reference to calculations used to determine the confidence deduction.

Refer to Annex I – NER Worksheet.

MR.68 Quantified NERs for the current monitoring period including references to calculations.

Refer to Annex I – NER Worksheet.

MR.70 A graph of NERs by monitoring period for all monitoring periods to date.

Refer to Annex I – NER Worksheet.

MR.76 Quantified NERs by vintage year for the current monitoring period including references to calculations.

Refer to Annex I – NER Worksheet.

MR.71 Reference to the VCS requirements used to determine the buffer account allocation.

The VCS Non-Permanence Risk Tool (version 3.1) was used to determine the buffer account allocation.

MR.72 Reference to the calculations used to determine the buffer account allocation.

Refer to section 3.4.2.2 (Determining the Buffer Account Allocation) of the Project Document.

5 ADDITIONAL INFORMATION

5.1 Allometric Equations

MR.88 If applicable, a detailed description of the process used to develop allometric equations, to include: a) sample size, b) distribution (e.g., diameter) of the sample, c) model fitting procedure, and d) model selection.

Tree biomass was estimated using published allometric equations at the genus or species level. However, there were many species in the inventory for which no published allometry was found. For these species, using data from destructive sampling either an equation was fit, or a general equation was modified and cross-checked with data from destructive sampling. Published allometric equations for trees were not found for 166 species, representing 85.6% of tree species and 80.9% of the basal area in the inventory.

Allometric equations were selected from the literature with an eye towards employing equations that were developed under similar climatic, edaphic, geographical and taxonomical conditions as the project area (Appendix M). As a further check of the validity of published allometric equations, the range of tree diameters contained in the inventory (also provided in Appendix B) were found generally to fall within the available diameter ranges of the applicable published equation used for each species.

Two palm species, *W. quinaria* and *S. exorrhiza,* were found to be the dominant palm species in the inventory. Accordingly, 32 and 31 stems were respectively harvested and measured from each species following the protocol for palm allometry development. (Refer to Annex D – Destructive Sampling Protocol – Palms.) Allometric equations for these species were fit using linear ordinary least squares (OLS) regression with a log-log transformation of the dependent and independent variables (*i.e.* a power model). Linear, exponential, quadratic, reciprocal, and logarithmic transformations also were attempted. Goodness of fit for all these transformations was compared by examination of residuals and of the R^2 values. The power model was selected for the two species as it provided the best fit to the data ($R^2$of .92 and .83, respectively), without any apparent patterns in the residuals. Non-linear OLS and generalized linear models also were considered and tested, but they did not provide any appreciable improvement in fit.

Fitted equations from the analysis are:

$$W.Q.biomass = e^{-0.5950} * 2.4739h$$

$$S.E.biomass = e^{0.4795} * 1.9574h$$

where h is height in meters and biomass is in terms of kilograms.

Back-transformed equations were cross-validated using the leave-one-out cross validation methods described in the VM0009 methodology. The equation for *W. quinaria* had a cross-validated error of approximately 5.3%, while that from *S. exorrhiza* was approximately 11%.

MR.93 A list of all selected allometric equations used to estimate biomass for trees and non-trees.

Refer to Annex M – Species Allometry.

MR.94 For each selected allometric equation, a list of species to which it is being applied and the proportion of the total carbon stocks predicted by the equation.

Refer to Annex M – Species Allometry.

MR.95 For each selected allometric equation, indication of when it was first employed to estimate carbon stocks in the project area (monitoring period number and year of monitoring event).

All allometric equations were first employed in the first monitoring period.

MR.96 For each selected allometric equation, indication of whether it was validated per sections 9.3.1.1 or 9.3.1.2.

Refer to Annex M – Species Allometry.

MR.97 Documentation of the source of each selected allometric equation and justification for their applicability to the project area considering climatic, edaphic, geographical and taxonomic similarities between the project location and the location in which the equation was derived.

Refer to Annex M – Species Allometry, which includes the source in the literature as well as the region and ecosystem type in which the respective allometric equations were developed.

5.1.1 Validating Previously Developed Allometric Equations

MR.98 A list of allometric equations validated by destructive sampling.

A general equation modified from Sierra, Valle, & Orrego, 2007 for palms and for the Chave 2005 equation for moist tropical forests for trees were used.

MR.99 For each, the number of trees (or non-trees) destructively sampled and the location where the measurements were made relative to the project area.

Species	# Trees Destructively Sampled
Trees	
	30
Palms	
General	32

Refer to Annex N – Allometry Sampling Map.

Location		# Trees Destructively Sampled
1	-77.30368856150 8.38232952219	30
2	-77.31401408060 8.44535378327	
3	-77.26199462660 8.37088986501	
4	-77.31482006360 8.44349825285	
5	-77.31728537430 8.43006823855	
6	-77.30037292310 8.38082940309	

Table 1: Tree locations

Tree	Latitude	Longitude
1	8.38354	77.2395
2	8.38348	77.23946

Tree	Latitude	Longitude
3	8.38332	77.23946
4	8.42444	77.24947
5	8.38299	77.24324
6	8.3827	77.24305
7	8.38294	77.24304
8	8.38291	77.2431
9	8.38291	77.24315
10	8.38296	77.24273
11	8.38302	77.24295
12	8.38282	77.2431
13	8.38308	77.24332
14	8.38236	77.2382
15	8.38237	77.23814
16	8.38272	77.23838
17	8.38272	77.23833
18	8.38215	77.238
19	8.38254	77.2382
20	8.38276	77.23807
21	8.38271	77.23812
22	8.38275	77.23811
23	8.38278	77.23803
24	8.38291	77.23796
25	8.28289	77.23804
26	8.38299	77.23809
27	8.38236	77.2383
28	8.38202	77.23919
29	8.3836	77.23942

Tree	Latitude	Longitude
30	8.38348	77.23951
31	8.38329	77.23939
32	8.35084	77.3317
33	8.35115	77.33124
34	8.3512	77.33124
35	8.35055	77.33224
36	8.35268	77.33028
37	8.42449	77.24969

Table 2: Palm measurement locations.

MR.100 A field protocol used to measure destructively sampled trees (or non-trees).

Refer to Annex D – Destructive Sampling Protocol – Palms and Annex E – Destructive Sampling Protocol – Trees.

MR.101 Justification that the field protocol for the destructive measurement method conservatively estimates biomass.

To derive acceptable equations for species with no allometric equation at the genus or species level, a subset of 30 trees was selected for destructive sampling. (Refer to Annex E – Destructive Sampling Protocol – Trees.) Five randomly allocated plots were chosen within an accessible area within or near the project area. At each plot, sampling teams sampled the closest six trees without literature equations at the species or genus level, recording stem and branch diameters and cutting and weighing selected branches.

Using these data, the general allometric equations were compared to the sample measurements and model coefficients were adjusted to ensure these equations were sufficiently conservative (less than or +/-10% difference between the measured and predicted values).

For the palm species in the inventory which were not *W. quinaria* or *S. exorrhiza*, a general equation modified from Sierra, Valle, & Orrego, 2007 was validated by destructively sampling 37 stems that were not *W. quinaria* or *S. exorrhiza*. The measured biomass was compared to that predicted by the allometric equation. The biomass measured during the course of sampling was 92% of that predicted by the equation. The equation used for the rest of the palm species in the inventory was

$$other.palm.biomass = 45.48 + 7.5h^{1.8}$$

where h is height in meters and biomass is in terms of kilograms.

The field protocol assumes that stems radiate outward form the base of tree, the shortest path from the base of the tree to the prescribed measurement zone. In reality, stems take a longer path to the outside of the measurement zone which would result in higher biomass than that estimated by the protocol. All samples for wood density, dry-to-wet ratios and biomass outside the measurement zone are based on unbiased statistical samples.

MR.102 For each allometric equation in the list, a figure showing all the destructive measurements of biomass compared to predicted values from its selected allometric equation.

Refer to Appendix A.

5.1.2 Validating Newly Developed Allometry

MR.103 A list of allometric equations cross-validated.

Fitted equations from the analysis for *W. quinaria* and *S. exorrhiza* are:

$$W.Q.biomass = e^{-0.5950} * 2.4739h$$

$$S.E.biomass = e^{0.4795} * 1.9574h$$

MR.104 For each, the number of trees (or non-trees) destructively sampled and the location where the measurements were made relative to the project area.

See MR 100 for the number of trees sampled for each species. See below table for locations

Species	Number	Lat	Long
S.Exorhizza	1	8.42447	77.24956
S.Exorhizza	2	8.42443	77.24941
S.Exorhizza	3	8.4242	77.24916
S.Exorhizza	4	8.42426	77.24894
S.Exorhizza	5	8.42439	77.24879
S.Exorhizza	6	8.42411	77.24855
S.Exorhizza	7	8.42412	77.25007
S.Exorhizza	8	8.42409	77.25006
S.Exorhizza	9	8.42462	77.25046
S.Exorhizza	10	8.42429	77.25044
S.Exorhizza	11	8.38215	77.238

Species	Number	Lat	Long
S.Exorhizza	12	8.42395	77.25074
S.Exorhizza	13	8.42399	77.2505
S.Exorhizza	14	8.42398	77.25057
S.Exorhizza	15	8.42387	77.25045
S.Exorhizza	16	8.4242	77.2506
S.Exorhizza	17	8.42412	77.2505
S.Exorhizza	18	8.42414	77.25055
S.Exorhizza	19	8.42433	77.25069
S.Exorhizza	20	8.42424	77.25074
S.Exorhizza	21	8.42431	77.25066
S.Exorhizza	22	8.42429	77.25058
S.Exorhizza	23	8.42452	77.25054
S.Exorhizza	24	8.42422	77.25043
S.Exorhizza	25	8.42391	77.25024
S.Exorhizza	26	8.42452	77.25012
S.Exorhizza	27	8.42459	77.24966
S.Exorhizza	28	8.42467	77.2497
S.Exorhizza	29	8.42452	77.2498
S.Exorhizza	30	8.42452	77.24982
S.Exorhizza	31	8.42445	77.2496
W. Quinaria	1	8.38382	77.23998
W. Quinaria	2	8.38389	77.24014
W. Quinaria	3	8.38344	77.23921
W. Quinaria	4	8.38356	77.23911
W. Quinaria	5	8.38349	77.23916
W. Quinaria	6	8.38352	77.23917
W. Quinaria	7	8.38339	77.23911

Species	Number	Lat	Long
W. Quinaria	8	8.38349	77.23904
W. Quinaria	9	8.38338	77.23897
W. Quinaria	10	8.38365	77.23927
W. Quinaria	11	8.3836	77.2392
W. Quinaria	12	8.38346	77.2393
W. Quinaria	13	8.38345	77.23916
W. Quinaria	14	8.38345	77.23925
W. Quinaria	15	8.38348	77.23923
W. Quinaria	16	8.38359	77.23922
W. Quinaria	17	8.38363	77.23914
W. Quinaria	18	8.38358	77.23934
W. Quinaria	19	8.38666	77.2393
W. Quinaria	20	8.3836	77.23939
W. Quinaria	21	8.38312	77.23939
W. Quinaria	22	8.38315	77.2393
W. Quinaria	23	8.38299	77.23942
W. Quinaria	24	8.38296	77.23939
W. Quinaria	25	8.38307	77.23945
W. Quinaria	26	8.38281	77.23942
W. Quinaria	27	8.38265	77.23905
W. Quinaria	28	8.38269	77.23905
W. Quinaria	29	8.38271	77.23901
W. Quinaria	30	8.38269	77.23903
W. Quinaria	31	8.3828	77.23928
W. Quinaria	32	8.38317	77.23929
W. Quinaria	31	8.42447	77.24956
W. Quinaria	32	8.42443	77.24941

MR.105A field protocol used to measure trees (or non-trees) when developing the equation.

Refer to Annex D – Destructive Sampling Protocol – Palms and Annex E – Destructive Sampling Protocol – Trees.

MR.106Justification that the field protocol for the destructive measurement method conservatively estimates biomass.

The protocol for palm measurement excludes all biomass not in the main bole, and requires that measurements be taken from a random sample from the species of interest. The sampling frame included stems from all height classes for each species of interest found in the inventory.

MR.107 For each allometric equation in the list, the value of $\overline{\overline{E}}$.

S. Exorrhiza	**0.0798**	**N=31**
W. Quinaria	**0.0286**	**N=32**

Table 3: ***Values of E and sample size***

Appendix A: Validation of Allometry

Palm	Biomass measured	Biomass predicted (kg)
1	25.7226145	167.0530767
2	395.4561522	237.0030008
3	59.3265531	237.0030008
4	40.22811599	206.8096176
5	17.28001434	130.3766545
6	64.50825566	155.6616529
7	62.37676074	309.4230303
8	6.679583551	87.36063807
9	10.71843257	99.66505542
10	269.3844925	901.5078689
11	591.6184566	425.2836645
12	146.9853635	548.9271574
13	1936.948149	1930.284706
14	664.1224412	317.3607591
15	579.5619561	424.5115316
16	633.7607214	481.0593999
17	301.3557606	705.4730961
18	949.2974755	814.8754179
19	377.8896009	1185.727034
20	466.3917185	308.1102456
21	314.5208279	263.4041222
22	92.84633555	157.9000536
23	192.1999604	548.0519355
24	759.7677577	481.0593999
25	172.2930417	676.1434833
26	325.3338941	294.5020107
27	77.1292834	300.9419901
28	959.3509849	644.5671382
29	33.82541322	136.422994
30	55.07397602	348.0539593
31	5.408743412	67.08487573
32	3105.504108	2098.799132
33	84.2080438	190.3087662
34	1505.590218	1562.255568
35	1861.267236	1211.033903
36	806.2576344	742.4599688
37	12.33012715	123.3661397
	Error (proportion)	**0.0798**

Tree	Biomass measured (kg)	Biomass predicted (kg)
1	79.81075171	56.38403618
2	1015.34447	861.028723
3	132.0200928	91.2264965
4	217.5798669	149.8094622
5	99.87101179	103.5732181
6	53.00578042	76.5502256
7	477.3006381	331.0970194
8	761.6577069	396.2526726
9	179.656803	102.2051362
10	124.1419714	144.4378162
11	92.34879753	77.49043476
12	2549.720333	4101.108309
13	165.9532059	117.1820799
14	81.5478014	110.7833828
15	97.36428177	84.3596477
16	93.38102164	75.31815916
17	44.67976078	57.58214346
18	145.6339307	150.1604702
19	1746.262038	1763.203195
20	1145.195491	732.7396968
21	75.87975738	243.2123945
22	106.27949	102.8068424
23	107.671108	236.5586334
24	231.9479374	210.4502186
25	179.3807141	135.2463924
26	310.0431111	200.2433634
27	155.2623346	118.8859336
28	79.03228881	81.45786895
29	135.9481433	104.1149656
30	108.6238649	85.89456365
	Error (proportion)	**0.0286**

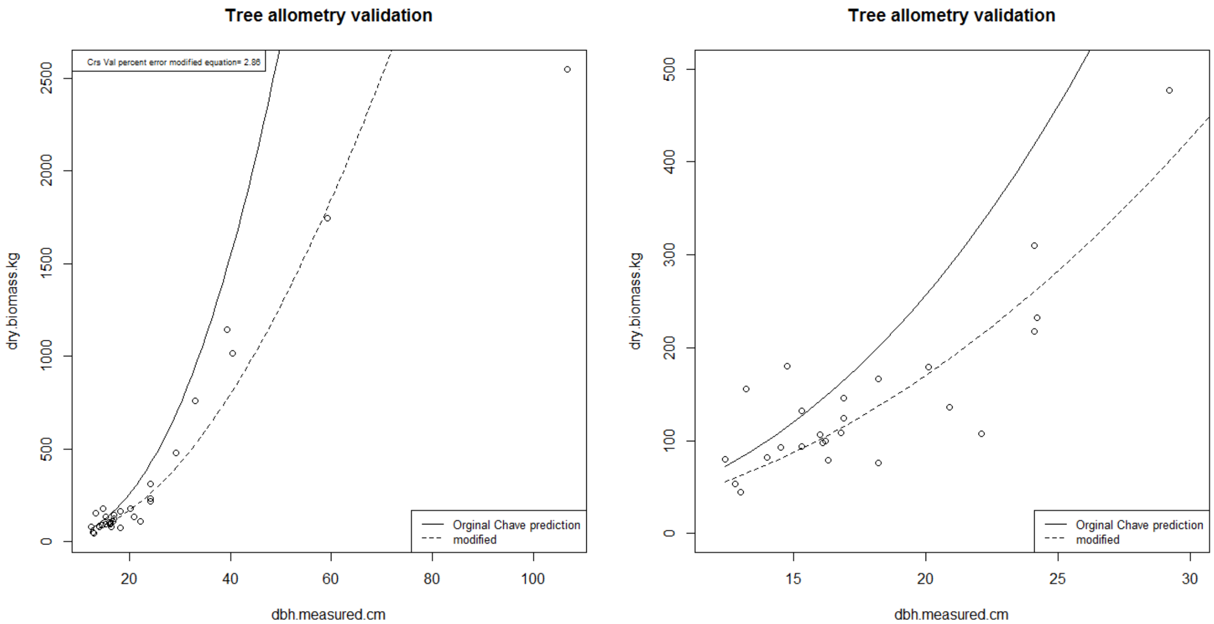

Figure 1: Measured tree biomass as compared to predicted biomass using derived allometric equation from Chave et. al 2005

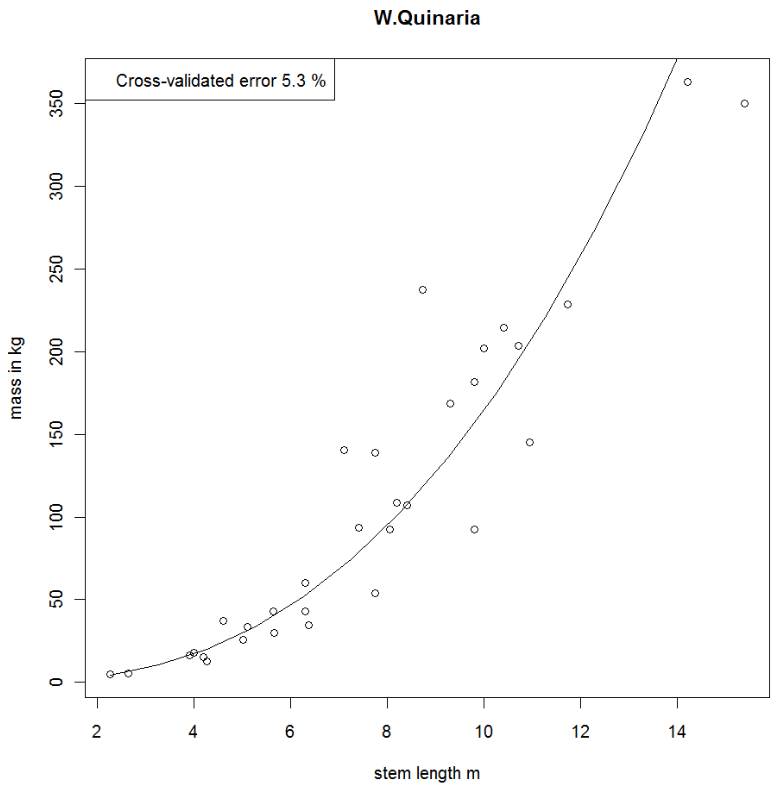

Figure 2: Measured values plotted against the model of best fit for W. Quinaria

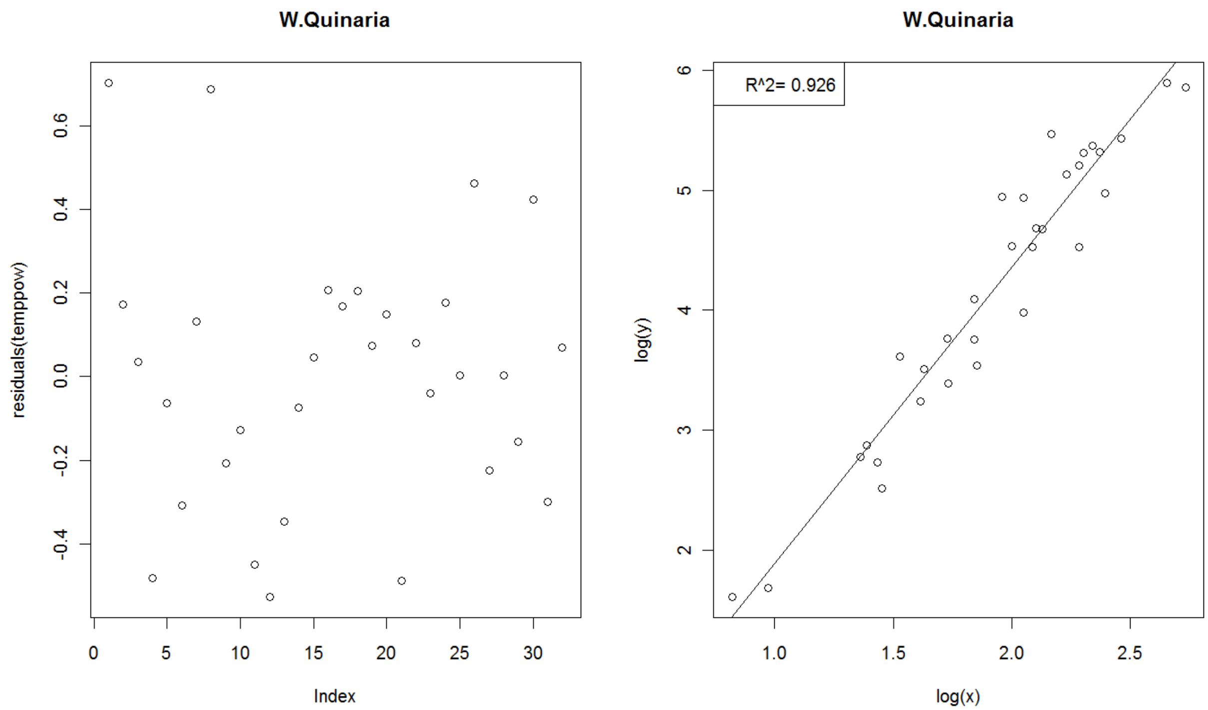

Figure 3: Log-log transformation.

The residuals for the fit of a log-log transformation of the data, and the corresponding linear model.

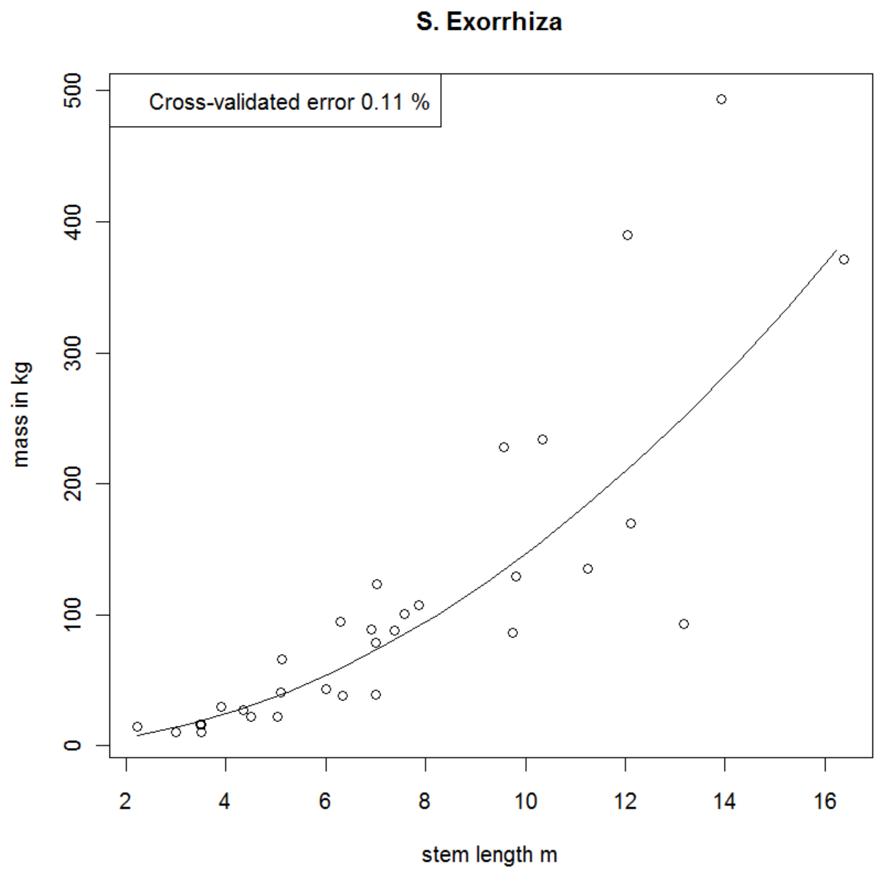

Figure 4: Measured values plotted against the model of best fit for S. Exorrhiza.

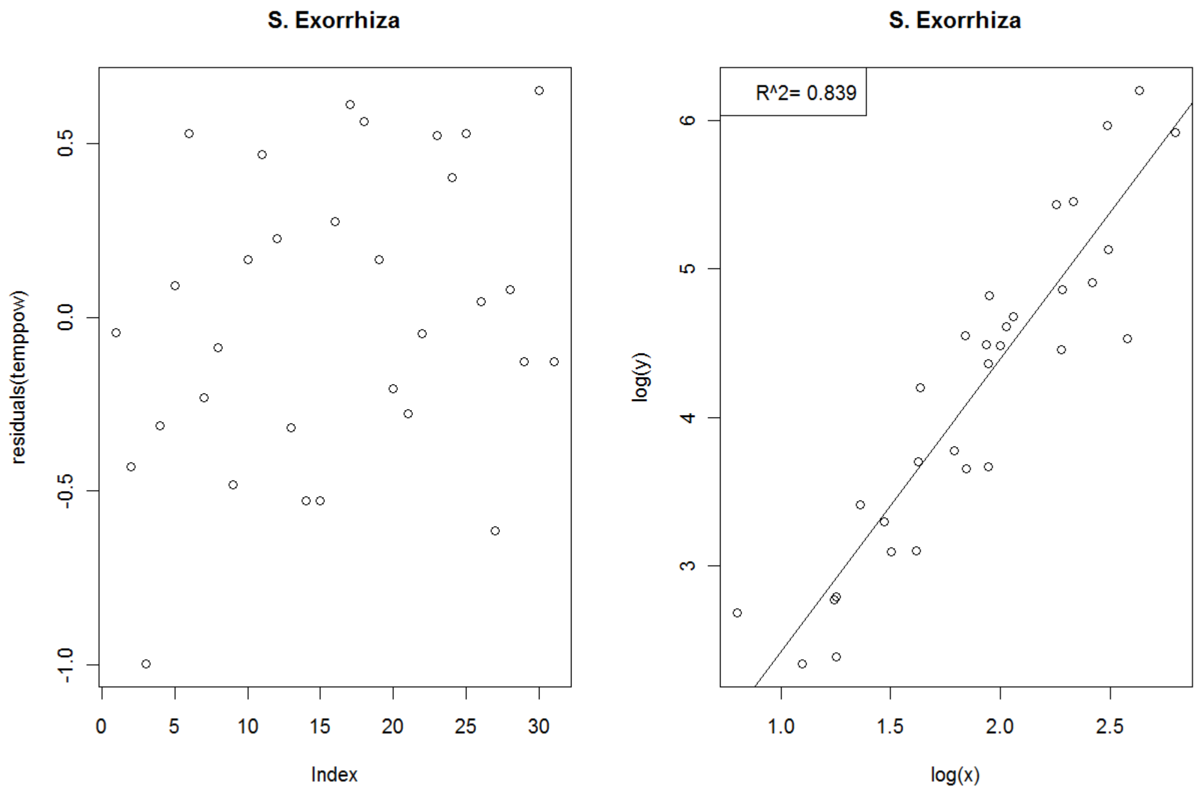

Figure 5: log-log transformation.

The residuals for the fit of a log-log transformation of the data, and the corresponding linear model.

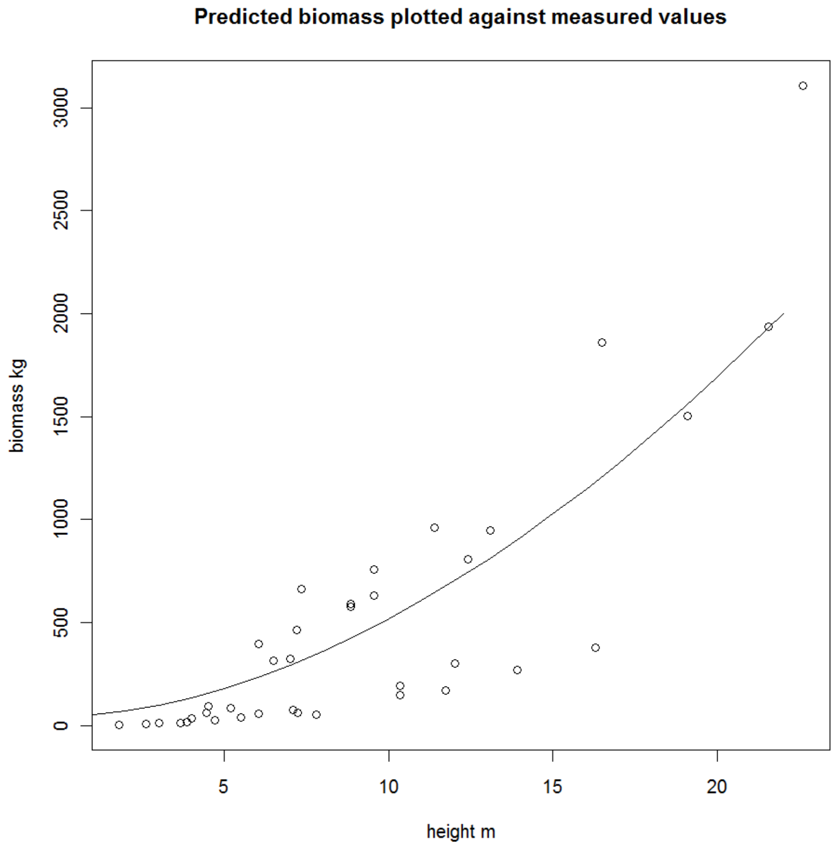

Figure 6: Predicted values from equation modified from Sierra, Valle, & Orrego, 2007 plotted against measured values from 37 palms